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MEMORANDUM

LONGITUDINAL STABILITY AND CONTROL CHARACTERISTICS AT MACH NUMBERS FROM 0.70 TO 2.22 OF A TRIANGULAR WING CONFIGURATION EQUIPPED WITH A CANARD CONTROL, A TRAILING-EDGE-FLAP CONTROL, OR A CAMBERED FOREBODY

By John W. Boyd and Gene P. Menees

Ames Research Center
Moffett Field, Calif.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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LONGITUDINAL STABILITY AND CONTROL CHARACTERISTICS AT MACH NUMBERS FROM 0.70 TO 2.22 OF A TRIANGULAR WING CONFIGURATION EQUIPPED WITH A CANARD CONTROL, A TRAILING-EDGE-FLAP CONTROL, OR A CAMBERED FOREBODY*

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SUMMARY

Results of an investigation to determine the static longitudinal stability and control characteristics of an aspect-ratio-2 triangular wing and body configuration equipped with either a canard control, a trailing-edge-flap control, or a cambered forebody are presented without analysis for Mach numbers from 0.70 to 2.22. The canard surface had a triangular plan form and a ratio of exposed area to total wing area of 7.8 percent. The hinge line of the canard was in the extended wing chord plane, 0.83 wing mean aerodynamic chord ahead of the reference center of moments. The trailing-edge controls were constant-chord full-span flaps with exposed area equal to 10.7 percent of the total wing area. The cambered body was a modified Sears-Haack body with camber only ahead of the wing apex. Data are presented for various canard and flap deflections at angles of attack ranging from -6° to +18°.

INTRODUCTION

A general research program directed at the investigation of longitudinal control devices capable of achieving low trim drag and adequate maneuverability for aircraft flying at supersonic speeds is in progress at the Ames Research Center. As a part of this program, several reports have already been published showing the longitudinal and directional characteristics of configurations employing canard controls (see refs. 1 through 7).

The present report presents without analysis the longitudinal stability and control characteristics of three additional configurations. One was a triangular canard configuration supplementing the previous

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*Title, Unclassified

canard studies and differing from that of reference 1 in that the canard surface was slightly larger and had a shorter lever arm. A second model was equipped with a full-span trailing-edge flap to assess the relative merits of this type control compared to the canard. The third configuration incorporated camber in the forward part of the body to assess the trimming capabilities of the cambered body. The basic configuration for the canard and flap models was identical to that of reference 1 and consisted of a triangular wing of aspect ratio 2.0 and a low-aspect-ratio vertical tail mounted on a Sears-Haack body of fineness ratio 12.5. The cambered body also utilized the same wing and vertical tail as the two previous models.

NOTATION

$\bar{c}$	mean aerodynamic chord of wing, ft
$\bar{c}_c$	mean aerodynamic chord of canard, ft
C_D	drag coefficient, $\frac{\text{drag}}{qS}$
C_{D_o}	drag coefficient at zero lift
C_L	lift coefficient, $\frac{\text{lift}}{qS}$
C_{L_α}	lift-curve slope, taken through zero angle of attack, per deg
C_m	pitching-moment coefficient, $\frac{\text{pitching moment}}{qS\bar{c}}$
$\left(\frac{L}{D}\right)_{max}$	maximum lift-drag ratio
M	free-stream Mach number
q	free-stream dynamic pressure, lb/sq ft
S	wing area formed by extending the leading and trailing edges to the plane of symmetry, sq ft
α	angle of attack of wing root chord, deg
δ_c	angle of deflection of canard control surface, positive when trailing edge is down, deg
δ_f	angle of deflection of flap, positive when trailing edge is down, deg

Configurations are denoted by the following letters used in combination:

B	symmetrical body
B_c	cambered body
C	canard
V	vertical tail
W	wing

APPARATUS

The experimental data were obtained in the Ames 6- by 6-foot supersonic wind tunnel which is a closed-circuit variable-pressure type with a Mach number range continuous from 0.70 to 2.22. The tunnel floor and ceiling have perforations to permit transonic testing. A somewhat more detailed description of this facility may be found in reference 1.

The models were sting mounted and the forces and moments were measured with an internal, strain-gage-type, six-component balance.

MODELS

Results of investigations of three models are reported herein. Two of the models incorporated movable control surfaces in combination with an aspect-ratio-2 triangular wing, a fineness ratio 12.5 Sears-Haack body, and a low-aspect-ratio vertical tail. The other model used the same wing and vertical tail with camber in the forward part of the body. Dimensional sketches of each of the three models are shown in figures 1, 2, and 3. Both the wing and the vertical tail had NACA 0003-63 thickness distributions streamwise.

One of the control devices was an all-movable triangular canard of aspect ratio 2 hinged about the 0.35 point of the canard mean aerodynamic chord (see fig. 1(a)). The hinge line was $0.83\bar{c}$ ahead of the reference center of moments $(0.28\bar{c})$. The constant thickness canard detailed in figure 1(b) had beveled leading and trailing edges. The ratio of the area of the exposed canard panels to the total wing area was 7.8 percent and the ratio of the total areas was 18 percent. This configuration was different from that of reference 1 in that the canard was slightly larger and was mounted farther aft on the body.

The other control device was a full-span trailing-edge flap with exposed area equal to 10.7 percent of the total wing area (see fig. 2).

The third configuration tested used a modified Sears-Haack body of fineness ratio 12.5, the forward 20.25 inches of which was cambered to provide a positive trimming moment. The camber in the forward part of the body was obtained simply by displacing the nose of the body upward until it was in line with a point on the upper surface of the body at station 20.25 inches (see fig. 3). Using the line connecting these two points as the reference axis the normal Sears-Haack distribution was used to form the forward portion of the body.

All of the component parts used herein were of solid steel construction to minimize aeroelastic effects. The surfaces were polished to give a smooth surface and were further treated to prevent corrosion.

TEST AND PROCEDURES

Range of Test Variables

Mach numbers of 0.70, 0.90, 1.00, 1.10, 1.30, 1.70, and 2.22 and angles of attack ranging from -6° to $+18^{\circ}$ were covered in the investigation. The test Reynolds number based on the wing mean aerodynamic chord was 1.84 million at Mach numbers of 1.0 and 1.10 and 3.68 million at all other Mach numbers. The smaller Reynolds number at transonic speeds was necessary because of model structural limitations. Canard deflections from 0° to 20° were investigated with the wing on and off. Flap deflections from $+4^{\circ}$ to -28° were tested. The exact control deflections are noted in tables I and II. Data were also obtained with the canard off for the wing on and off. Wires were placed on all of the models at the locations shown in figures 1, 2, and 3 to induce transition.

Reduction of Data

The data presented herein have been reduced to standard coefficient form. The pitching moments were referred to the 0.28 point of the wing mean aerodynamic chord for the canard configuration and the 0.33 point of the wing mean aerodynamic chord for the flap and cambered-body configurations. The results have been adjusted to account for the following effects:

Base drag.- The base pressure was measured and the data were adjusted to correspond to a base pressure equal to the free-stream static pressure.

Stream inclination.- The data were corrected for stream angle inclinations which were never greater than 0.30° throughout the Mach number range of the tests.

RESULTS

The results in this report are presented without analysis in order to expedite publication. All of the experimental data are presented in tables I through III. Selected portions of the data for each configuration are shown in figures 4 through 6.

Figure 4 presents the lift, drag, and pitching-moment characteristics with the canard on and deflected and with the canard off for three test Mach numbers. Figure 5 shows similar data for various trailing-edge-flap deflections, and figure 6 presents the lift, drag, and pitching-moment characteristics for the cambered- and symmetrical-body configurations. Summarized in figure 7 are the maximum lift-drag ratios, the lift-curve slopes, minimum drag coefficients, and the aerodynamic centers as functions of Mach number for the canard configuration at zero deflection, and for the canard off or the trailing-edge-flap configuration at zero deflection. Figure 8 summarizes these same characteristics for the cambered- and symmetrical-body configurations.

Ames Research Center
National Aeronautics and Space Administration
Moffett Field, Calif., Jan. 21, 1959

REFERENCES

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2. Peterson, Victor L., and Menees, Gene P.: Static Stability and Control of Canard Configurations at Mach Numbers From 0.70 to 2.22 - Lateral-Directional Characteristics of a Triangular Wing and Canard. NACA RM A57L18, 1958.

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TABLE I.- AERODYNAMIC CHARACTERISTICS OF THE CONFIGURATION WITH THE CANARD

(a) BVW

M	α, deg	C_L	C_D	C_m	M	α, deg	C_L	C_D	C_m
0.70	-6.4	-0.311	0.0404	0.0364	1.30	6.0	0.278	0.0399	-0.0580
	-4.2	-.196	.0214	.0236		8.0	.374	.0620	-.0779
	-2.2	-.101	.0130	.0127		10.0	.470	.0910	-.0983
	-.7	-.039	.0107	.0076		12.0	.562	.1264	-.1175
	-.2	-.018	.0104	.0056		14.1	.650	.1677	-.1359
	.4	.004	.0103	.0040		16.1	.735	.2146	-.1530
	1.9	.066	.0113	-.0028		18.1	.809	.2660	-.1633
	3.9	.164	.0183	-.0135					
	5.8	.260	.0317	-.0240	1.70	-6.3	-.239	.0376	.0511
	7.8	.368	.0538	-.0354		-4.1	-.160	.0238	.0348
	9.8	.478	.0844	-.0455		-2.2	-.084	.0163	.0187
	11.7	.588	.1210	-.0563		-.7	-.031	.0140	.0074
	13.8	.702	.1681	-.0681		-.1	-.010	.0136	.0036
	15.8	.808	.2225	-.0759		.4	.012	.0137	-.0010
	17.8	.919	.2862	-.0840		1.8	.065	.0152	-.0119
						3.8	.143	.0215	-.0276
0.90	-6.0	-.324	.0411	.0481		5.8	.216	.0327	-.0429
	-3.9	-.202	.0221	.0293		7.8	.290	.0493	-.0573
	-1.9	-.098	.0125	.0150		9.8	.362	.0721	-.0720
	-.6	-.037	.0110	.0085		11.8	.430	.0988	-.0853
	0	-.012	.0107	.0061		13.9	.499	.1299	-.0980
	.6	.010	.0107	.0031		15.9	.565	.1666	-.1094
	2.0	.077	.0120	-.0055		17.9	.627	.2063	-.1176
	4.0	.180	.0200	-.0201					
	6.0	.291	.0370	-.0361	2.22	-5.9	-.185	.0308	.0353
	7.9	.410	.0620	-.0549		-3.6	-.114	.0191	.0226
	10.0	.540	.0992	-.0770		-1.7	-.057	.0139	.0120
	12.0	.661	.1434	-.0976		-.3	-.013	.0124	.0037
	14.0	.789	.1983	-.1253		.2	.003	.0123	.0005
	16.0	.913	.2627	-.1521		.8	.022	.0126	-.0023
						2.2	.068	.0145	-.0115
1.30	-6.0	-.291	.0418	.0650		4.2	.129	.0207	-.0230
	-4.0	-.189	.0254	.0425		6.2	.187	.0309	-.0336
	-2.0	-.093	.0169	.0209		8.3	.244	.0453	-.0437
	-.5	-.026	.0145	.0067		10.2	.300	.0629	-.0528
	0	-.005	.0139	.0032		12.3	.357	.0862	-.0620
	.6	.019	.0145	-.0024		14.2	.409	.1115	-.0687
	2.1	.087	.0167	-.0167		16.2	.465	.1426	-.0746
	4.0	.181	.0246	-.0369		18.3	.519	.1777	-.0806

TABLE I.- AERODYNAMIC CHARACTERISTICS OF THE CONFIGURATION WITH THE CANARD - Continued

(b) BVWC, $\delta_c = 0^\circ$

M	α, deg	C_L	C_D	C_m	M	α, deg	C_L	C_D	C_m
0.70	-5.1	-0.252	0.0307	0.0129	1.30	2.0	0.087	0.0185	-0.0123
	-4.0	-.199	.0228	.0113		4.0	.183	.0274	-.0263
	-2.1	-.100	.0137	.0065		8.0	.375	.0660	-.0531
	-.1	-.009	.0110	.0025		12.0	.566	.1325	-.0764
	.9	.037	.0115	-.0003		16.1	.751	.2264	-.0954
	1.8	.081	.0127	-.0022		18.0	.839	.2818	-.1049
	3.9	.181	.0209	-.0067					
	7.9	.392	.0602	-.0134	1.70	-4.0	-.160	.0252	.0223
	11.9	.621	.1340	-.0177		-2.0	-.083	.0176	.0125
	15.8	.856	.2434	-.0212		-.1	-.005	.0149	.0019
	17.9	.971	.3130	-.0224		.9	.034	.0154	-.0037
						1.9	.071	.0170	-.0087
0.90	-4.8	-.265	.0312	.0235		3.9	.150	.0244	-.0185
	-3.9	-.207	.0235	.0183		7.9	.296	.0542	-.0347
	-1.9	-.096	.0137	.0090		11.9	.442	.1054	-.0502
	0	-.003	.0109	.0012		16.0	.586	.1785	-.0623
	1.1	.047	.0118	-.0022		17.9	.652	.2204	-.0658
	2.1	.101	.0135	-.0071					
	4.1	.211	.0239	-.0162	2.22	-3.7	-.114	.0204	.0134
	8.1	.442	.0703	-.0359		-1.7	-.052	.0145	.0069
	12.0	.691	.1542	-.0638		.2	.009	.0129	-.0008
	16.1	.943	.2807	-.0960		1.3	.043	.0138	-.0045
	18.1	1.056	.3534	-.1175		2.3	.073	.0156	-.0079
						4.4	.138	.0229	-.0144
1.30	-4.9	-.234	.0340	.0348		8.3	.254	.0488	-.0248
	-3.9	-.182	.0266	.0273		12.3	.368	.0916	-.0332
	-1.9	-.091	.0186	.0149		16.3	.484	.1525	-.0385
	0	0	.0158	.0013		18.4	.541	.1903	-.0412
	1.1	.045	.0166	-.0063					

TABLE I.- AERODYNAMIC CHARACTERISTICS OF THE CONFIGURATION WITH THE CANARD - Continued

(c) BVWC, $\delta_c = 10^\circ$

M	α, deg	C_L	C_D	C_m	M	α, deg	C_L	C_D	C_m
0.70	-6.0	-0.298	0.0378	0.0358	1.30	4.0	0.177	0.0336	-0.0084
	-4.0	-.190	.0221	.0301		7.9	.371	.0737	-.0356
	-2.1	-.092	.0151	.0259		12.0	.568	.1452	-.0597
	0	-.007	.0150	.0218		15.9	.748	.2382	-.0809
	.9	.041	.0161	.0208		18.0	.830	.2938	-.0887
	1.9	.084	.0183	.0183					
	3.8	.176	.0267	.0111	1.70	-6.1	-.230	.0373	.0507
	7.8	.404	.0735	.0067		-4.1	-.154	.0257	.0411
	11.9	.631	.1534	.0037		-2.1	-.076	.0194	.0305
	15.8	.869	.2683	-.0086		-.1	-.001	.0182	.0206
	17.8	.982	.3365	-.0153		.9	.037	.0196	.0151
						1.9	.077	.0221	.0090
0.90	-5.9	-.315	.0401	.0500		3.9	.148	.0303	-.0016
	-3.9	-.198	.0230	.0377		7.8	.296	.0619	-.0203
	-1.9	-.095	.0154	.0291		11.8	.440	.1146	-.0346
	0	0	.0151	.0224		15.7	.576	.1853	-.0462
	1.1	.057	.0171	.0180		17.9	.646	.2309	-.0511
	2.1	.103	.0197	.0134					
	4.1	.205	.0304	.0013	2.22	-5.7	-.164	.0289	.0345
	8.1	.451	.0841	-.0167		-3.6	-.105	.0205	.0288
	12.1	.706	.1745	-.0525		-1.6	-.041	.0164	.0214
	16.0	.946	.2960	-.0945		.2	.016	.0163	.0139
	18.0	1.058	.3706	-.1146		1.3	.050	.0179	.0092
						2.4	.080	.0203	.0054
1.30	-5.9	-.278	.0415	.0635		4.3	.141	.0280	-.0024
	-4.0	-.187	.0281	.0503		8.3	.261	.0567	-.0141
	-1.9	-.093	.0209	.0365		12.3	.375	.1015	-.0211
	0	-.004	.0199	.0230		16.2	.481	.1604	-.0248
	1.1	.043	.0214	.0157		18.2	.535	.1973	-.0258
	2.0	.085	.0238	.0089					

TABLE I.- AERODYNAMIC CHARACTERISTICS OF THE CONFIGURATION WITH THE CANARD - Continued

(d) BVWC, $\delta_c = 20^\circ$

M	α, deg	C_L	C_D	C_m	M	α, deg	C_L	C_D	C_m
0.70	-6.1	-0.287	0.0463	0.0551	1.30	4.0	0.171	0.0479	0.0074
	-4.1	-.181	.0327	.0510		8.0	.360	.0890	-.0262
	-2.0	-.070	.0269	.0456		12.0	.559	.1591	-.0515
	-.1	.012	.0296	.0453		15.9	.739	.2526	-.0729
	.9	.057	.0321	.0436		18.0	.825	.3090	-.0850
	1.9	.098	.0357	.0403					
	3.8	.183	.0448	.0303	1.70	-6.0	-.215	.0431	.0679
	7.8	.381	.0850	.0088		-4.1	-.141	.0333	.0579
	11.9	.609	.1605	-.0057		-2.1	-.065	.0283	.0462
	15.8	.871	.2817	-.0239		-.1	.009	.0286	.0349
	17.8	.983	.3491	-.0350		.9	.048	.0304	.0287
						1.9	.084	.0336	.0224
0.90	-5.9	-.308	.0497	.0710		3.9	.148	.0420	.0120
	-3.9	-.188	.0346	.0587		7.8	.293	.0744	-.0107
	-1.9	-.075	.0287	.0491		11.8	.440	.1293	-.0227
	0	.021	.0309	.0434		15.8	.576	.2014	-.0345
	1.1	.070	.0338	.0390		17.8	.638	.2433	-.0390
	2.1	.117	.0377	.0340					
	4.0	.205	.0493	.0222	2.22	-5.6	-.149	.0338	.0475
	8.0	.427	.0927	-.0169		-3.7	-.091	.0271	.0407
	12.1	.670	.1798	-.0422		-1.5	-.026	.0241	.0327
	16.0	.944	.3120	-.0963		.2	.030	.0253	.0251
	18.0	1.038	.3766	-.1076		1.3	.061	.0274	.0211
						2.4	.089	.0307	.0165
1.30	-5.9	-.274	.0501	.0862		4.3	.148	.0388	.0085
	-3.9	-.177	.0372	.0711		8.3	.261	.0680	-.0039
	-1.9	-.083	.0314	.0553		12.2	.378	.1140	-.0098
	0	-.001	.0321	.0413		16.2	.482	.1752	-.0101
	1.1	.046	.0343	.0329		18.2	.530	.2107	-.0106
	2.0	.087	.0376	.0254					

TABLE I.- AERODYNAMIC CHARACTERISTICS OF THE CONFIGURATION WITH THE CANARD - Continued

(e) BV

M	α, deg	C_L	C_D	C_m	M	α, deg	C_L	C_D	C_m
0.70	-6.3	-0.007	0.0068	-0.0132	1.30	4.1	0.007	0.0081	0.0087
	-4.3	-.003	.0064	-.0095		6.0	.008	.0084	.0127
	-2.2	-.002	.0060	-.0053		8.0	.013	.0093	.0168
	-.7	0	.0057	-.0018		10.1	.019	.0107	.0213
	-.2	.001	.0057	-.0007		12.0	.027	.0130	.0261
	.3	.002	.0055	.0004		14.1	.035	.0162	.0314
	1.7	.003	.0055	.0041		16.1	.047	.0199	.0371
	3.8	.004	.0057	.0086		18.1	.059	.0247	.0433
	5.7	.007	.0056	.0128					
	7.8	.011	.0072	.0166	1.70	-6.2	-.012	.0106	-.0130
	9.8	.015	.0076	.0205		-4.1	-.009	.0092	-.0084
	11.8	.021	.0083	.0248		-2.1	-.005	.0087	-.0040
	13.8	.029	.0102	.0293		-.7	-.003	.0084	-.0010
	15.8	.036	.0126	.0339		-.2	-.001	.0084	.0001
	17.9	.043	.0159	.0398		.4	-.002	.0082	.0021
						1.8	.001	.0081	.0049
0.90	-6.0	-.008	.0069	-.0136		3.9	.005	.0083	.0095
	-3.9	-.004	.0062	-.0092		5.8	.009	.0088	.0140
	-1.9	0	.0060	-.0051		9.8	.022	.0110	.0227
	-.5	.001	.0057	-.0020		11.8	.032	.0140	.0272
	.1	.001	.0053	-.0002		13.9	.042	.0177	.0326
	.5	.002	.0054	.0007		15.9	.058	.0236	.0390
	2.0	.003	.0053	.0041		17.9	.076	.0314	.0467
	4.1	.005	.0054	.0090					
	6.0	.009	.0058	.0128	2.22	-5.7	-.016	.0092	-.0113
	8.0	.012	.0065	.0170		-3.6	-.010	.0081	-.0069
	10.1	.019	.0078	.0209		-1.7	-.007	.0073	-.0026
	12.1	.024	.0091	.0255		-.2	-.002	.0070	.0004
	14.1	.031	.0117	.0301		.3	-.003	.0070	.0016
	16.1	.038	.0140	.0352		.8	-.001	.0070	.0030
	18.1	.048	.0176	.0412		2.2	.001	.0069	.0059
						4.3	.005	.0069	.0106
1.30	-6.0	-.010	.0099	-.0133		6.3	.011	.0080	.0149
	-4.0	-.005	.0088	-.0094		8.3	.017	.0093	.0190
	-1.9	-.001	.0084	-.0050		10.3	.028	.0119	.0237
	-.5	0	.0082	-.0017		12.3	.041	.0157	.0280
	0	.001	.0082	-.0004		14.3	.058	.0213	.0341
	.6	.001	.0081	.0005		16.4	.075	.0289	.0408
	2.0	.004	.0073	.0040		18.4	.093	.0372	.0471

TABLE I.- AERODYNAMIC CHARACTERISTICS OF THE CONFIGURATION WITH THE CANARD - Continued

(f) BVC, $\delta_c = 0^\circ$

M	α, deg	C_L	C_D	C_m
0.70	-6.2	-0.052	0.0120	-0.0385
	-4.1	-.034	.0094	-.0255
	-2.1	-.019	.0077	-.0131
	-.1	-.003	.0069	-.0015
	.8	.005	.0068	.0044
	1.8	.010	.0070	.0109
	3.9	.026	.0079	.0239
	7.8	.061	.0134	.0501
	11.8	.100	.0251	.0785
	15.8	.139	.0422	.1075
	17.9	.155	.0518	.1194
0.90	-6.1	-.052	.0120	-.0396
	-4.0	-.033	.0090	-.0253
	-2.1	-.018	.0076	-.0134
	0	-.001	.0069	-.0004
	.9	.005	.0068	.0068
	1.8	.013	.0069	.0122
	3.9	.031	.0087	.0248
	7.9	.069	.0150	.0530
	11.7	.107	.0269	.0814
	15.9	.149	.0460	.1109
	17.9	.164	.0557	.1219
1.30	-6.0	-.047	.0147	-.0352
	-4.0	-.031	.0119	-.0235
	-2.0	-.015	.0104	-.0118
	0	-.001	.0097	-.0006
	.9	.006	.0098	.0046
	1.9	.011	.0098	.0111
	4.0	0.028	0.0111	0.0229
	7.9	.058	.0170	.0463
	11.9	.092	.0286	.0700
	16.0	.129	.0453	.0932
	18.0	.147	.0560	.1044
1.70	-6.2	-.042	.0141	-.0314
	-4.3	-.031	.0120	-.0220
	-2.2	-.017	.0101	-.0111
	-.2	-.005	.0092	.0001
	.7	.002	.0090	.0048
	1.7	.008	.0094	.0103
	3.8	.023	.0104	.0206
	7.8	.049	.0158	.0408
	11.7	.079	.0262	.0609
	15.7	.115	.0425	.0789
	17.8	.141	.0549	.0871
2.22	-5.8	-.037	.0119	-.0244
	-3.7	-.025	.0095	-.0155
	-1.7	-.013	.0080	-.0066
	.3	0	.0074	.0025
	1.2	.005	.0077	.0069
	2.3	.011	.0081	.0118
	4.3	.024	.0095	.0205
	8.2	.049	.0153	.0381
	12.2	.079	.0255	.0525
	16.3	.123	.0450	.0642
	18.3	.147	.0582	.0711

TABLE I.- AERODYNAMIC CHARACTERISTICS OF THE CONFIGURATION WITH THE CANARD - Continued

(g) BVC, $\delta_c = 10^\circ$

M	α, deg	C_L	C_D	C_m	M	α, deg	C_L	C_D	C_m
0.70	-6.2	-0.003	0.0078	-0.0106	1.30	3.9	0.064	0.0218	0.0466
	-4.1	.009	.0080	.0024		7.9	.093	.0330	.0670
	-2.1	.025	.0095	.0150		11.9	.123	.0484	.0890
	-.1	.041	.0121	.0269		15.9	.151	.0678	.1111
	.8	.051	.0138	.0346		18.0	.166	.0787	.1221
	1.8	.058	.0155	.0409					
	3.9	.076	.0200	.0555	1.70	-6.2	-.009	.0110	-.0106
	7.8	.113	.0333	.0816		-4.2	.004	.0107	-.0015
	11.7	.141	.0491	.1043		-2.2	.017	.0114	.0093
	15.8	.162	.0654	.1208		-.2	.029	.0131	.0203
	17.9	.165	.0715	.1236		.7	.035	.0144	.0250
						1.6	.040	.0156	.0300
0.90	-6.1	-.003	.0077	-.0108		3.7	.052	.0190	.0400
	-4.0	.010	.0082	.0019		7.7	.077	.0284	.0571
	-2.0	.029	.0094	.0162		11.6	.100	.0411	.0755
	0	.046	.0122	.0297		15.7	.128	.0583	.0938
	.8	.054	.0138	.0355		17.7	.148	.0703	.1031
	1.8	.064	.0165	.0435					
	3.9	.082	.0213	.0566	2.22	-5.7	-.008	.0098	-.0080
	7.9	.120	.0360	.0833		-3.7	.003	.0093	.0011
	11.8	.143	.0506	.1031		-1.7	.016	.0098	.0103
	15.9	.158	.0644	.1136		.2	.027	.0112	.0186
	17.9	.172	.0747	.1237		1.2	.031	.0123	.0232
						2.2	.036	.0136	.0272
1.30	-6.0	-.006	.0112	-.0108		4.3	.046	.0165	.0360
	-4.0	.009	.0111	-.0001		8.2	.069	.0256	.0510
	-2.0	.023	.0124	.0121		12.1	.092	.0374	.0670
	0	.037	.0146	.0238		16.2	.135	.0589	.0799
	.9	.045	.0160	.0298		18.3	.158	.0731	.0874
	1.9	.051	.0176	.0348					

TABLE I.- AERODYNAMIC CHARACTERISTICS OF THE CONFIGURATION WITH THE CANARD - Concluded.

(h) BVC, $\delta_c = 20^o$

M	α, deg	C_L	C_D	C_m	M	α, deg	C_L	C_D	C_m
0.70	-6.1	0.033	0.0157	0.0178	1.30	3.8	0.089	0.0388	0.0614
	-4.1	.051	.0191	.0289		7.9	.113	.0531	.0798
	-2.1	.067	.0235	.0414		11.8	.130	.0690	.0989
	-.1	.081	.0289	.0538		15.8	.151	.0862	.1147
	.8	.089	.0323	.0609		18.1	.163	.0969	.1242
	1.8	.095	.0354	.0669					
	3.9	.111	.0431	.0793	1.70	-6.2	.016	.0162	.0074
	7.8	.130	.0563	.0958		-4.2	.029	.0178	.0158
	11.8	.132	.0633	.0984		-2.2	.040	.0203	.0256
	15.8	.141	.0745	.1096		-.2	.051	.0238	.0343
	17.9	.154	.0833	.1190		.7	.057	.0258	.0383
						1.7	.063	.0282	.0422
0.90	-6.1	.036	.0162	.0177		3.7	.074	.0332	.0510
	-4.1	.053	.0196	.0292		7.7	.090	.0442	.0674
	-2.1	.069	.0248	.0415		11.6	.110	.0586	.0839
	-.1	.084	.0300	.0539		15.7	.134	.0765	.1013
	.8	.091	.0334	.0596		17.9	.155	.0902	.1110
	1.8	.098	.0367	.0660					
	3.9	.113	.0440	.0783	2.22	-5.7	.012	.0145	.0060
	7.8	.124	.0550	.0917		-3.7	.025	.0156	.0136
	11.9	.136	.0667	.1014		-1.7	.035	.0176	.0222
	15.9	.148	.0801	.1175		.2	.044	.0204	.0295
	17.9	.164	.0916	.1289		1.2	.050	.0224	.0333
						2.2	.054	.0242	.0379
1.30	-6.0	.026	.0175	.0118		4.2	.063	.0285	.0451
	-4.1	.038	.0198	.0212		8.2	.079	.0390	.0604
	-1.9	.053	.0235	.0317		12.1	.100	.0528	.0744
	-.1	.065	.0276	.0406		16.3	.143	.0765	.0916
	.9	.071	.0303	.0466		18.2	.161	.0897	.1002
	1.8	.077	.0328	.0504					

TABLE II.- AERODYNAMIC CHARACTERISTICS OF THE CONFIGURATION WITH THE TRAILING-EDGE FLAP

(a) $\delta_f = 4.1^\circ$

M	α, deg	C_L	C_D	C_m	M	α, deg	C_L	C_D	C_m
0.70	-6.2	-0.235	0.0321	-0.0128	1.10	2.2	0.165	0.0234	-0.0490
	-.2	.060	.0116	-.0323		6.0	.389	.0565	-.0922
	1.8	.148	.0148	-.0385		10.0	.604	.1194	-.1209
	5.7	.346	.0411	-.0515					
	9.9	.579	.1046	-.0641	1.30	-5.9	-.260	.0389	.0311
						-1.9	-.062	.0163	-.0039
0.90	-6.0	-.242	.0340	-.0118		.2	.033	.0160	-.0199
	-2.0	-.016	.0123	-.0345		2.1	.125	.0195	-.0360
	0	.082	.0129	-.0440		6.0	.315	.0454	-.0689
	2.1	.181	.0176	-.0519		10.1	.507	.1006	-.0994
	6.0	.402	.0507	-.0748					
	10.1	.646	.1207	-.1038	1.70	-6.2	-.217	.0348	.0274
						-2.0	-.066	.0166	.0024
1.00	-5.8	-.296	.0439	.0242		-.1	.014	.0148	-.0105
	-1.7	-.049	.0177	-.0155		1.9	.088	.0175	-.0231
	.2	.059	.0169	-.0342		5.8	.238	.0370	-.0467
	2.3	.181	.0230	-.0561		9.9	.380	.0778	-.0683
	6.2	.415	.0586	-.0973					
	10.2	.645	.1294	-.1307	2.22	-5.7	-.184	.0301	.0202
						-1.7	-.066	.0152	.0040
1.10	-6.0	-.284	.0446	.0290		.3	.009	.0133	-.0070
	-2.0	-.059	.0193	-.0069		2.3	.081	.0156	-.0176
	.1	.056	.0184	-.0287		6.2	.197	.0334	-.0335
						10.3	.310	.0672	-.0472

TABLE II.- AERODYNAMIC CHARACTERISTICS OF THE CONFIGURATION WITH THE TRAILING-EDGE FLAP - Continued

(b) $\delta_f = 0^\circ$

M	α, deg	C_L	C_D	C_m
0.70	-6.4	-0.311	0.0404	0.0227
	-4.2	-.197	.0216	.0155
	-2.2	-.101	.0130	.0085
	-.7	-.039	.0108	.0060
	-.2	-.018	.0104	.0050
	.4	.003	.0103	.0044
	1.9	.066	.0113	.0004
	3.9	.164	.0182	-.0062
	5.8	.259	.0316	-.0123
	7.8	.368	.0537	-.0189
	9.8	.477	.0844	-.0240
	11.7	.587	.1210	-.0298
	13.8	.702	.1682	-.0365
	15.8	.807	.2224	-.0389
	17.8	.918	.2860	-.0417
0.90	-6.0	-.325	.0411	.0338
	-3.9	-.204	.0222	.0210
	-1.9	-.099	.0126	.0113
	-.6	-.038	.0111	.0069
	0	-.013	.0107	.0055
	.6	.009	.0106	.0039
	2.0	.076	.0119	-.0019
	4.0	.179	.0199	-.0121
	6.0	.291	.0370	-.0231
	7.9	.409	.0618	-.0361
	10.0	.540	.0992	-.0527
	12.0	.660	.1433	-.0675
	14.0	.788	.1981	-.0888
	16.0	.913	.2627	-.1104
1.00	-5.8	-.347	.0484	.0603
	-3.8	-.223	.0296	.0406
	-1.8	-.110	.0175	.0213
	-.3	-.031	.0149	.0096
	.2	-.007	.0154	.0046
	.7	.024	.0155	.0008
	2.2	.103	.0177	-.0112
	4.2	.222	.0287	-.0312
	6.3	.345	.0491	-.0517
	8.2	.459	.0768	-.0705
	10.3	.579	.1153	-.0897
	12.2	.686	.1586	-.1065
	14.2	.793	.2091	-.1234
	16.3	.898	.2706	-.1400
	18.2	.989	.3323	-.1537
1.10	-6.0	-.334	.0484	.0625
	-4.0	-.216	.0295	.0437
	-2.0	-.106	.0195	.0237
	-.4	-.028	.0162	.0116
	.1	-.004	.0160	.0072
	.6	.024	.0163	.0020
	2.1	.101	.0185	-.0108

M	α, deg	C_L	C_D	C_m
1.10	4.1	0.213	0.0279	-0.0326
	6.1	.330	.0469	-.0532
	8.1	.446	.0724	-.0719
	10.1	.544	.1043	-.0821
	12.1	.637	.1450	-.0990
	14.1	.740	.1938	-.1195
	16.1	.841	.2513	-.1348
	18.1	.924	.3103	-.1474
1.30	-6.0	-.292	.0420	.0530
	-4.0	-.189	.0254	.0345
	-2.0	-.094	.0170	.0175
	-.5	-.026	.0145	.0056
	0	-.005	.0139	.0029
	.6	.019	.0145	-.0010
	2.1	.087	.0167	-.0125
	4.0	.180	.0246	-.0287
	6.0	.278	.0399	-.0453
	8.0	.373	.0619	-.0609
	10.0	.469	.0909	-.0767
	12.0	.561	.1262	-.0916
	14.1	.650	.1678	-.1062
	16.1	.735	.2146	-.1191
	18.1	.809	.2661	-.1276
1.70	-6.3	-.239	.0377	.0409
	-4.1	-.150	.0239	.0279
	-2.2	-.085	.0164	.0154
	-.7	-.031	.0140	.0065
	-.1	-.010	.0136	.0034
	.4	.012	.0137	0
	1.8	.064	.0152	-.0087
	3.8	.143	.0216	-.0212
	5.8	.215	.0327	-.0330
	7.8	.289	.0494	-.0443
	9.8	.361	.0721	-.0553
	11.8	.429	.0988	-.0657
	13.9	.499	.1299	-.0754
	15.9	.564	.1665	-.0831
	17.9	.626	.2063	-.0883
2.22	-5.9	-.186	.0309	.0273
	-3.6	-.114	.0191	.0176
	-1.7	-.057	.0139	.0097
	-.3	-.013	.0124	.0034
	.2	.002	.0123	.0009
	.8	.021	.0126	-.0013
	2.2	.068	.0145	-.0082
	4.2	.129	.0207	-.0172
	6.2	.187	.0309	-.0253
	8.3	.245	.0453	-.0327
	10.2	.300	.0629	-.0394
	12.3	.356	.0862	-.0456
	14.2	.409	.1115	-.0502
	16.2	.464	.1422	-.0531
	18.3	.519	.1776	-.0574

TABLE II.- AERODYNAMIC CHARACTERISTICS OF THE CONFIGURATION WITH THE TRAILING-EDGE FLAP - Continued

(c) $\delta_f = -4.2^\circ$

M	α, deg	C_L	C_D	C_m
0.70	-6.3	-0.393	0.0505	0.0585
	-2.2	-.178	.0170	.0427
	-.3	-.090	.0118	.0343
	1.8	.002	.0103	.0286
	5.7	.195	.0254	.0159
	9.8	.405	.0715	.0080
	13.8	.637	.1528	-.0042
	17.9	.856	.2668	-.0107
0.90	-2.0	-.194	.0180	.0559
	0	-.094	.0127	.0455
	2.1	.005	.0111	.0351
	6.0	.226	.0315	.0121
	10.1	.470	.0884	-.0143
1.00	-5.8	-.417	.0592	.1017
	-1.8	-.167	.0239	.0547
	.2	-.054	.0190	.0348
	2.2	.060	.0173	.0145
	6.2	.296	.0454	-.0260
	10.2	.522	.1050	-.0574
	14.3	.739	.1971	-.0902
	18.3	.935	.3157	-.1186
1.10	-6.0	-.390	.0564	.0991
	-2.0	-.153	.0232	.0533
	.1	-.050	.0182	.0334
	2.1	.063	.0180	.0128
	6.0	.281	.0416	-.0271

M	α, deg	C_L	C_D	C_m
1.10	10.0	0.501	0.0974	-0.0565
	14.1	.691	.1810	-.0890
	18.1	.874	.2928	-.1150
1.30	-6.0	-.318	.0464	.0714
	-1.9	-.120	.0186	.0351
	.1	-.031	.0152	.0192
	2.1	.059	.0162	.0035
	6.0	.249	.0371	-.0282
	10.0	.438	.0850	-.0588
	14.1	.621	.1595	-.0881
	18.1	.786	.2562	-.1109
1.70	-6.2	-.255	.0410	.0519
	-2.2	-.100	.0178	.0262
	-.2	-.026	.0146	.0130
	1.9	.048	.0154	.0009
	5.8	.200	.0312	-.0223
	9.8	.343	.0685	-.0443
	13.8	.477	.1229	-.0637
	17.8	.606	.1968	-.0766
2.22	-5.8	-.189	.0320	.0332
	-1.6	-.065	.0148	.0159
	.3	-.006	.0126	.0070
	2.3	.054	.0141	-.0016
	6.3	.174	.0292	-.0176
	10.3	.286	.0601	-.0313
	14.3	.392	.1075	-.0406
	18.4	.501	.1709	-.0475

TABLE II.- AERODYNAMIC CHARACTERISTICS OF THE CONFIGURATION WITH THE TRAILING-EDGE FLAP - Continued

(d) $\delta_f = -8.2^\circ$

M	α, deg	C_L	C_D	C_m	M	α, deg	C_L	C_D	C_m
0.70	-6.3	-0.466	0.0626	0.0917	1.10	10.0	0.461	0.0937	-0.0303
	-2.3	-.254	.0237	.0761		14.1	.667	.1790	-.0671
	-.2	-.158	.0154	.0682		18.1	.844	.2861	-.0905
	1.9	-.067	.0115	.0621					
	5.8	.120	.0214	.0498	1.30	-6.0	-.359	.0547	.0958
	9.8	.333	.0620	.0381		-2.0	-.157	.0236	.0572
	13.9	.568	.1389	.0273		0	-.066	.0181	.0405
	17.8	.760	.2379	.0255		2.2	.030	.0181	.0235
						5.9	.216	.0353	-.0095
0.90	-6.1	-.504	.0687	.1235		10.0	.414	.0825	-.0425
	-2.0	-.267	.0262	.0944		14.1	.598	.1551	-.0712
	0	-.166	.0178	.0838		18.1	.765	.2511	-.0931
	2.1	-.075	.0138	.0748					
	6.0	.138	.0269	.0541	1.70	-6.1	-.273	.0458	.0646
	10.0	.388	.0781	.0270		-2.2	-.122	.0217	.0389
	14.0	.642	.1671	-.0071		-.2	-.044	.0170	.0256
	18.1	.805	.2703	-.0215		1.8	.026	.0170	.0132
						5.8	.184	.0315	-.0128
1.00	-5.8	-.490	.0720	.1363		9.8	.328	.0669	-.0343
	-1.8	-.250	.0301	.1004		13.9	.469	.1221	-.0543
	.2	-.127	.0226	.0772		17.9	.598	.1953	-.0672
	2.3	-.005	.0206	.0534					
	6.2	.243	.0437	.0091	2.22	-5.8	-.204	.0359	.0421
	10.2	.485	.1018	-.0303		-1.7	-.080	.0173	.0243
	14.2	.702	.1902	-.0621		.3	-.016	.0140	.0150
	18.3	.906	.3073	-.0916		2.2	.044	.0152	.0057
						6.3	.166	.0294	-.0117
1.10	-6.1	-.458	.0703	.1316		10.3	.279	.0595	-.0255
	-1.9	-.216	.0299	.0870		14.3	.389	.1056	-.0353
	.1	-.109	.0223	.0686		18.3	.498	.1691	-.0418
	2.1	.004	.0210	.0459					

TABLE II.- AERODYNAMIC CHARACTERISTICS OF THE CONFIGURATION WITH THE TRAILING-EDGE FLAP - Continued

(e) $\delta_f = -12.3^{\circ}$

M	α, deg	C_L	C_D	C_m	M	α, deg	C_L	C_D	C_m
0.70	-6.3	-0.535	0.0767	0.1232	1.10	6.0	0.188	0.0424	0.0305
	-2.3	-.323	.0330	.1075		10.0	.417	.0923	-.0049
	-.3	-.226	.0220	.0983		14.1	.631	.1733	-.0471
	1.9	-.135	.0159	.0928		18.0	.809	.2784	-.0683
	5.8	.045	.0191	.0808					
	9.8	.260	.0548	.0701	1.30	-6.1	-.392	.0645	.1174
	13.8	.484	.1229	.0587		-2.0	-.188	.0301	.0781
	17.8	.675	.2161	.0554		0	-.096	.0235	.0609
						2.1	-.005	.0217	.0442
0.90	-6.1	-.550	.0816	.1525		6.0	.189	.0375	.0085
	-2.0	-.315	.0357	.1242		10.0	.385	.0809	-.0256
	.1	-.218	.0255	.1121		14.1	.571	.1515	-.0559
	2.1	-.129	.0191	.1034		18.0	.736	.2428	-.0780
	6.0	.078	.0285	.0841					
	10.0	.331	.0752	.0560	1.70	-6.3	-.296	.0535	.0765
	14.0	.598	.1610	.0116		-2.2	-.139	.0267	.0509
	18.1	.757	.2591	.0026		-.1	-.060	.0210	.0370
						1.9	.012	.0200	.0244
1.00	-5.9	-.526	.0867	.1602		5.8	.164	.0325	-.0015
	-1.8	-.295	.0408	.1291		9.8	.314	.0666	-.0252
	.1	-.188	.0310	.1127		13.9	.452	.1200	-.0441
	2.3	-.067	.0270	.0895		17.9	.579	.1905	-.0568
	6.2	.194	.0452	.0378					
	10.2	.441	.1002	-.0028	2.22	-5.8	-.215	.0411	.0495
	14.2	.664	.1861	-.0419		-1.7	-.091	.0207	.0316
	18.2	.860	.2962	-.0702		.3	-.029	.0172	.0226
						2.3	.030	.0175	.0135
1.10	-6.0	-.498	.0823	.1569		6.3	.152	.0299	-.0042
	-2.0	-.266	.0406	.1185		10.3	.265	.0584	-.0186
	.1	-.158	.0313	.0984		14.3	.373	.1023	-.0276
	2.0	-.047	.0262	.0773		18.3	.479	.1631	-.0338

TABLE II.- AERODYNAMIC CHARACTERISTICS OF THE CONFIGURATION WITH THE TRAILING-EDGE FLAP - Continued

(f) $\delta_f = -20.3^\circ$

M	α, deg	C_L	C_D	C_m
1.00	0.2	-0.282	0.0525	0.1581
	2.3	-.179	.0445	.1455
	6.2	.079	.0536	.0984
	10.2	.358	.1033	.0442
	14.3	.600	.1834	-.0017
	18.3	.802	.2911	-.0339
1.10	.1	-.251	.0511	.1463
	2.1	-.137	.0432	.1259
	6.0	.100	.0511	.0777
	10.0	.343	.0945	.0374
	14.1	.568	.1709	-.0098
	18.1	.755	.2719	-.0360
1.30	-6.1	-.454	.0881	.1563
	-2.0	-.249	.0476	.1152
	.1	-.155	.0380	.0973
	2.0	-.064	.0336	.0802
	6.0	.128	.0446	.0450

M	α, deg	C_L	C_D	C_m
1.30	10.0	0.331	0.0833	0.0072
	14.1	.527	.1499	-.0283
	18.1	.698	.2388	-.0532
1.70	-6.2	-.328	.0701	.1000
	-2.2	-.172	.0398	.0729
	-.2	-.098	.0328	.0597
	1.9	-.019	.0298	.0458
	5.8	.130	.0392	.0196
	9.7	.279	.0680	-.0053
	13.9	.424	.1189	-.0275
	17.9	.551	.1867	-.0403
2.22	-5.8	-.241	.0553	.0667
	-1.7	-.111	.0314	.0469
	.3	-.053	.0266	.0378
	2.3	.009	.0252	.0278
	6.3	.132	.0347	.0090
	14.4	.362	.1032	-.0184
	18.2	.461	.1589	-.0235

TABLE II.- AERODYNAMIC CHARACTERISTICS OF THE CONFIGURATION WITH THE TRAILING-EDGE FLAP - Concluded

(g) $\delta_f = -28.3^{\circ}$

M	α, deg	C_L	C_D	C_m	M	α, deg	C_L	C_D	C_m
1.00	0.2	-0.330	0.0784	0.1793	1.30	10.0	0.286	0.0905	0.0311
	2.2	-.241	.0678	.1730		14.0	.481	.1509	-.0042
	6.2	0	.0688	.1346		18.1	.653	.2377	-.0290
	10.2	.272	.1128	.0866					
	14.2	.535	.1866	.0285	1.70	-.2	-.123	.0439	.0759
	18.2	.732	.2886	.0012		1.9	-.048	.0398	.0620
						5.8	.100	.0460	.0368
1.10	0	-.309	.0723	.1731		9.9	.255	.0748	.0109
	2.0	-.213	.0618	.1598		13.9	.400	.1208	-.0128
	6.0	.032	.0658	.1116		17.9	.531	.1879	-.0266
	10.0	.270	.1043	.0732					
	14.1	.510	.1746	.0189	2.22	.4	-.068	.0366	.0500
	18.1	.694	.2721	-.0027		2.3	-.010	.0342	.0404
						6.3	.112	.0409	.0210
1.30	.1	-.213	.0546	.1244		10.3	.230	.0638	.0030
	2.1	-.110	.0472	.1054		14.3	.342	.1029	-.0086
	6.0	.078	.0552	.0716		18.4	.448	.1606	-.0153

TABLE III.- AERODYNAMIC CHARACTERISTICS OF THE CONFIGURATION WITH THE CAMBERED BODY

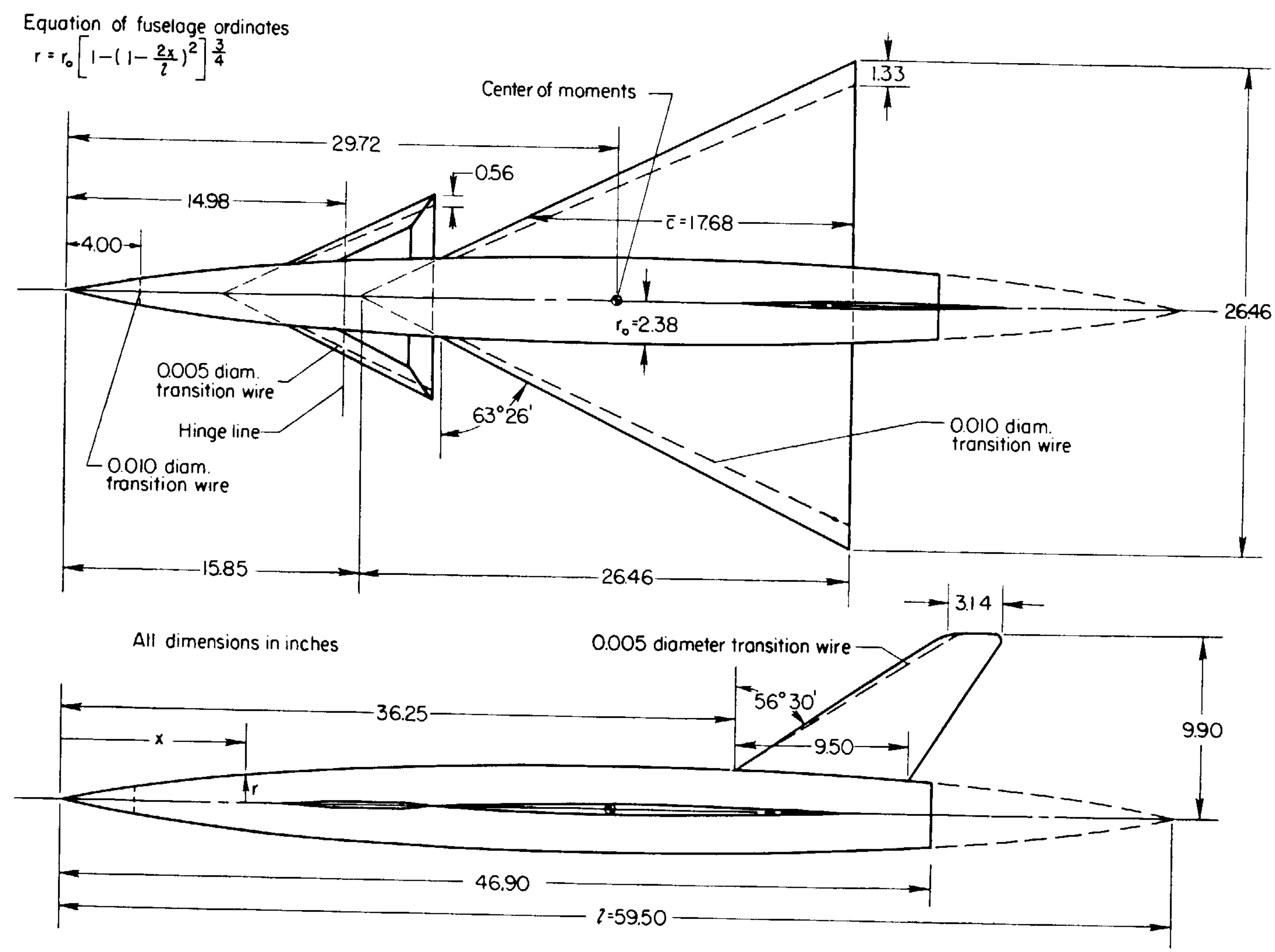
(a) BVW

M	α, deg	C_L	C_D	C_m	M	α, deg	C_L	C_D	C_m
0.70	-6.4	-0.311	0.0404	0.0227	1.10	4.1	0.213	0.0279	-0.0326
	-4.2	-.197	.0216	.0155		6.1	.330	.0469	-.0532
	-2.2	-.101	.0130	.0085		8.1	.446	.0724	-.0719
	-.7	-.039	.0108	.0060		10.1	.544	.1043	-.0821
	-.2	-.018	.0104	.0050		12.1	.637	.1450	-.0990
	.4	.003	.0103	.0044		14.1	.740	.1938	-.1195
	1.9	.066	.0113	.0004		16.1	.841	.2513	-.1348
	3.9	.164	.0182	-.0062		18.1	.924	.3103	-.1474
	5.8	.259	.0316	-.0123					
	7.8	.368	.0537	-.0189	1.30	-6.0	-.292	.0420	.0530
	9.8	.477	.0844	-.0240		-4.0	-.139	.0254	.0345
	11.7	.587	.1210	-.0298		-2.0	-.094	.0170	.0175
	13.8	.702	.1682	-.0365		-.5	-.026	.0145	.0056
	15.8	.807	.2224	-.0389		0	-.005	.0139	.0029
	17.8	.918	.2860	-.0417		.6	.019	.0145	-.0010
						2.1	.037	.0167	-.0125
0.90	-6.0	-.325	.0411	.0338		4.0	.130	.0246	-.0287
	-3.9	-.204	.0222	.0210		6.0	.278	.0399	-.0453
	-1.9	-.099	.0126	.0113		8.0	.373	.0619	-.0609
	-.6	-.038	.0111	.0069		10.0	.469	.0909	-.0767
	0	-.013	.0107	.0055		12.0	.561	.1262	-.0916
	.6	.009	.0106	.0039		14.1	.650	.1678	-.1062
	2.0	.076	.0119	-.0019		16.1	.735	.2146	-.1191
	4.0	.179	.0199	-.0121		18.1	.809	.2661	-.1276
	6.0	.291	.0370	-.0231					
	7.9	.409	.0618	-.0361	1.70	-6.3	-.239	.0377	.0409
	10.0	.540	.0992	-.0527		-4.1	-.150	.0239	.0279
	12.0	.660	.1433	-.0675		-2.2	-.085	.0164	.0154
	14.0	.788	.1981	-.0888		-.7	-.031	.0140	.0065
	16.0	.913	.2627	-.1104		-.1	-.010	.0136	.0034
						.4	.012	.0137	0
						1.8	.054	.0152	-.0087
1.00	-5.8	-.347	.0484	.0603		3.8	.143	.0216	-.0212
	-3.8	-.223	.0296	.0406		5.8	.215	.0327	-.03[illegible]0
	-1.8	-.110	.0175	.0213		7.8	.289	.0494	-.044[illegible]
	-.3	-.031	.0149	.0096		9.8	.361	.0721	-.0553
	.2	-.007	.0154	.0046		11.8	.429	.0988	-.0657
	.7	.024	.0155	.0008		13.9	.499	.1299	-.0754
	2.2	.103	.0177	-.0112		15.9	.564	.1665	-.0831
	4.2	.222	.0287	-.0312		17.9	.626	.2063	-.0883
	6.3	.345	.0491	-.0517					
	8.2	.459	.0768	-.0705	2.22	-5.9	-.186	.0309	.0273
	10.3	.579	.1153	-.0897		-3.6	-.114	.0191	.0176
	12.2	.686	.1586	-.1065		-1.7	-.057	.0139	.0097
	14.2	.793	.2091	-.1234		-.3	-.013	.0124	.0034
	16.3	.898	.2706	-.1400		.2	.002	.0123	.0009
	18.2	.989	.3323	-.1537		.8	.021	.0126	-.0013
						2.2	.068	.0145	-.0082
1.10	-6.0	-.334	.0484	.0625		4.2	.129	.0207	-.0172
	-4.0	-.216	.0295	.0437		6.2	.187	.0309	-.0253
	-2.0	-.106	.0195	.0237		8.3	.245	.0453	-.0327
	-.4	-.028	.0162	.0116		10.2	.300	.0629	-.0394
	.1	-.004	.0160	.0072		12.3	.356	.0862	-.0456
	.6	.024	.0163	.0020		14.2	.409	.1115	-.0502
	2.1	.101	.0185	-.0108		16.2	.464	.1422	-.0531
						18.3	.519	.1776	-.0574

TABLE III.- AERODYNAMIC CHARACTERISTICS OF THE CONFIGURATION WITH THE CAMBERED BODY - Concluded

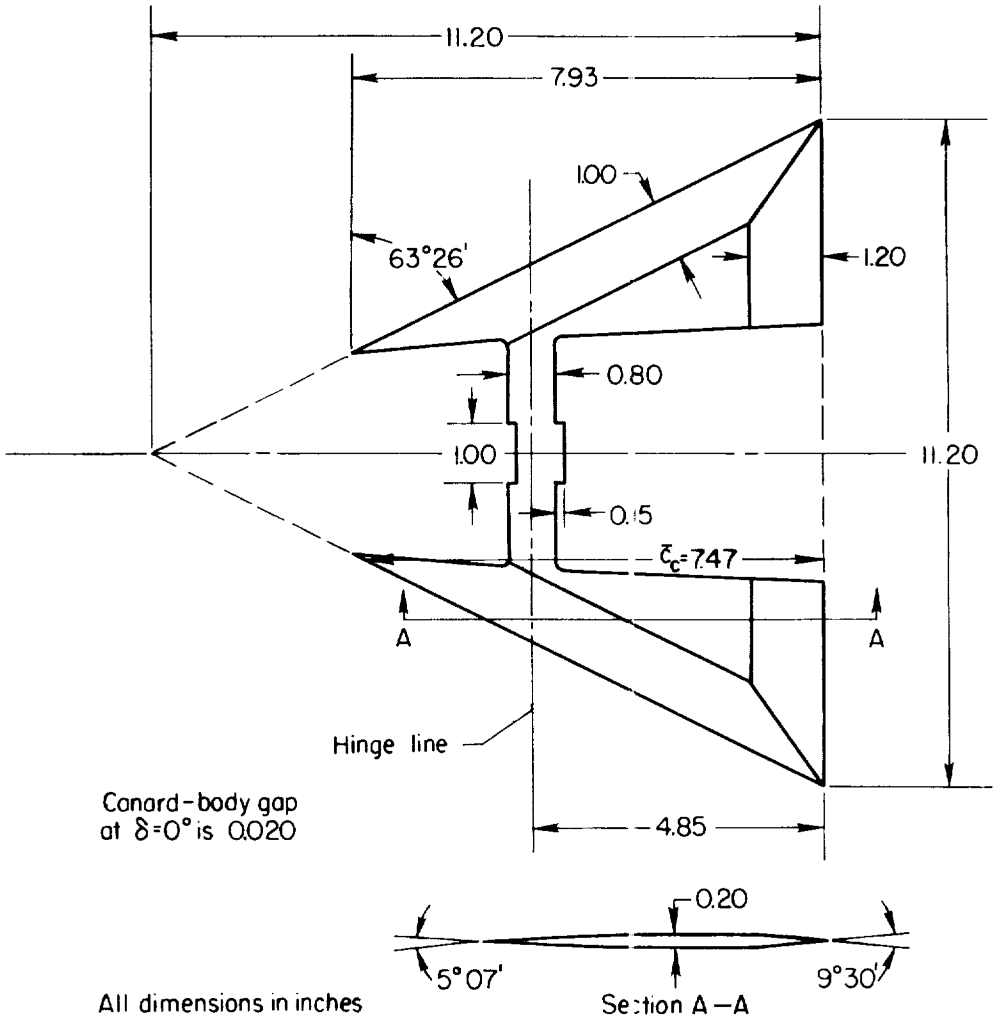
(b) B_cVW

M	α, deg	C_L	C_D	C_m	M	α, deg	C_L	C_D	C_m
0.70	-6.3	-0.312	0.0402	0.0305	1.10	6.0	0.328	0.0469	-0.0492
	-4.3	-.203	.0227	.0230		7.9	.455	.0739	-.0712
	-2.2	-.101	.0136	.0158		10.1	.559	.1099	-.0798
	-.8	-.037	.0111	.0110		14.1	.761	.2030	-.1134
	.3	.008	.0106	.0079		18.1	.943	.3222	-.1369
	1.8	.078	.0115	.0028					
	3.7	.172	.0186	-.0037	1.30	-6.1	-.290	.0424	.0573
	5.8	.281	.0343	-.0102		-4.1	-.192	.0266	.0403
	7.7	.383	.0560	-.0156		-2.0	-.090	.0175	.0219
	9.7	.495	.0871	-.0204		-.6	-.028	.0153	.0106
	13.8	.719	.1744	-.0284		.5	.027	.0151	.0013
						2.0	.095	.0176	-.0103
0.90	-6.1	-.330	.0421	.0440		4.1	.196	.0261	-.0271
	-3.9	-.206	.0226	.0297		6.1	.289	.0426	-.0419
	-2.0	-.104	.0131	.0183		8.1	.383	.0655	-.0561
	-.4	-.028	.0108	.0110		9.9	.466	.0917	-.0677
	.5	.020	.0106	.0069		14.0	.647	.1704	-.0913
	2.1	.096	.0125	-.0005					
	4.0	.208	.0224	-.0126	1.70	-6.2	-.233	.0371	.0462
	6.0	.317	.0399	-.0231		-4.1	-.157	.0243	.0336
	8.1	.455	.0703	-.0402		-2.2	-.082	.0171	.0209
	10.0	.566	.1046	-.0528		-.6	-.024	.0148	.0109
	14.1	.823	.2104	-.0915		.3	.012	.0139	.0053
						1.8	.070	.0159	-.0042
1.00	-5.8	-.345	.0476	.0687		3.8	.145	.0228	-.0165
	-3.7	-.218	.0283	.0484		5.9	.224	.0356	-.0275
	-1.8	-.104	.0191	.0272		7.8	.293	.0527	-.0361
	-.3	-.025	.0176	.0126		9.9	.368	.0762	-.0447
	.7	.031	.0152	.0045		13.9	.503	.1367	-.0544
	2.2	.118	.0198	-.0116		17.9	.634	.2177	-.0604
	4.2	.240	.0284	-.0324					
	6.2	.366	.0521	-.0532	2.22	-5.9	-.171	.0298	.0339
	8.2	.484	.0818	-.0714		-3.7	-.111	.0200	.0249
	10.3	.601	.1206	-.0886		-1.7	-.046	.0142	.0156
	14.3	.820	.2205	-.1191		-.3	-.003	.0133	.0097
	18.3	1.015	.3463	-.1451		.7	.027	.0135	.0056
						2.3	.078	.0161	-.0012
1.10	-6.0	-.338	.0502	.0705		4.2	.137	.0229	-.0084
	-4.0	-.215	.0309	.0488		6.2	.192	.0335	-.0138
	-1.9	-.109	.0200	.0308		8.3	.252	.0490	-.0181
	-.6	-.037	.0188	.0168		10.3	.308	.0691	-.0206
	.3	.019	.0166	.0076		14.4	.420	.1217	-.0266
	2.1	.108	.0206	-.0082		18.2	.525	.1882	-.0336
	4.0	.219	.0294	-.0286					



(a) Dimensional sketch of complete model.

Figure 1.- Details and dimensions of canard model.



(b) Details of canard surface.

Figure 1.- Concluded.

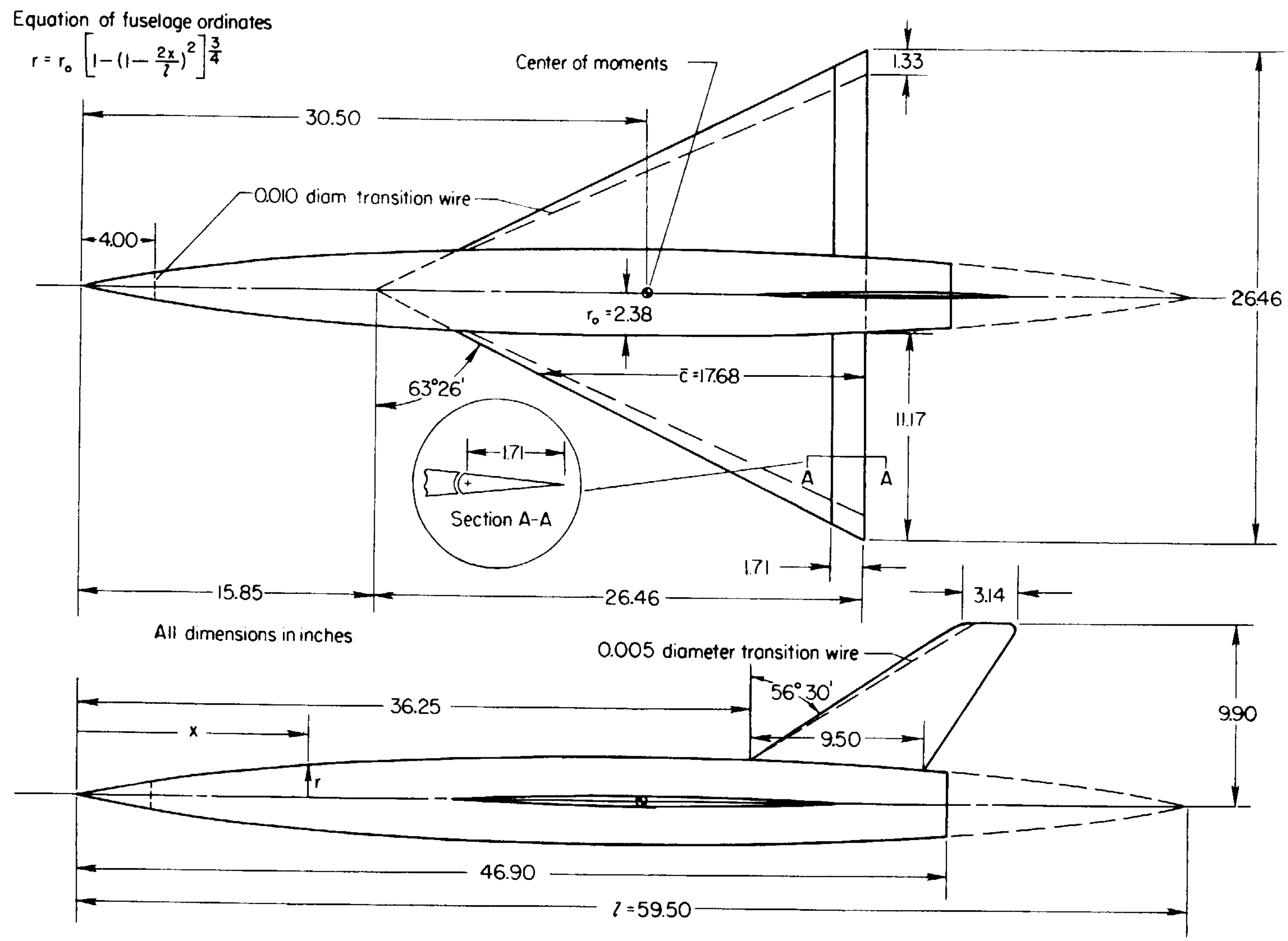


Figure 2.- Details and dimensions of flap model.

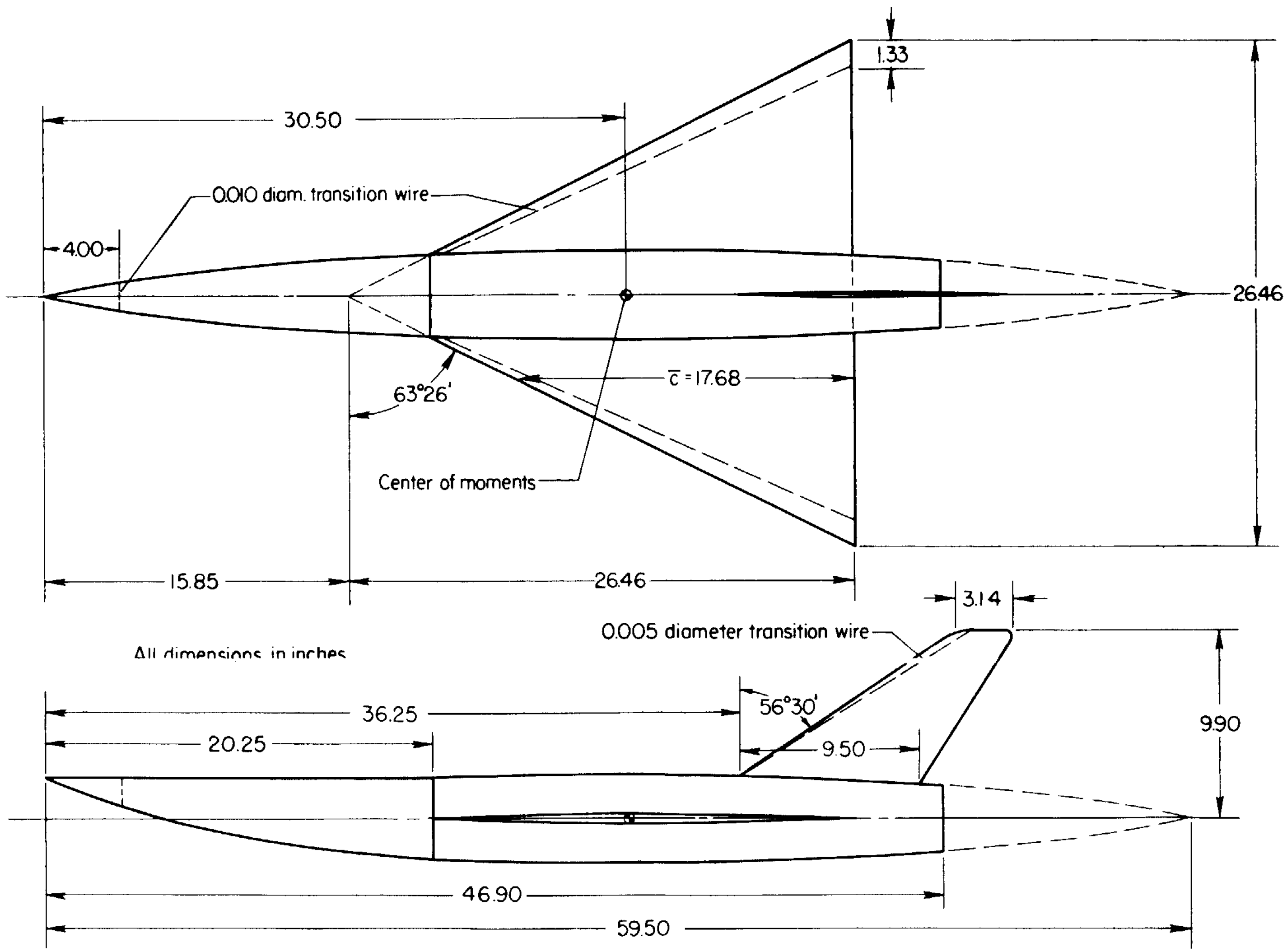
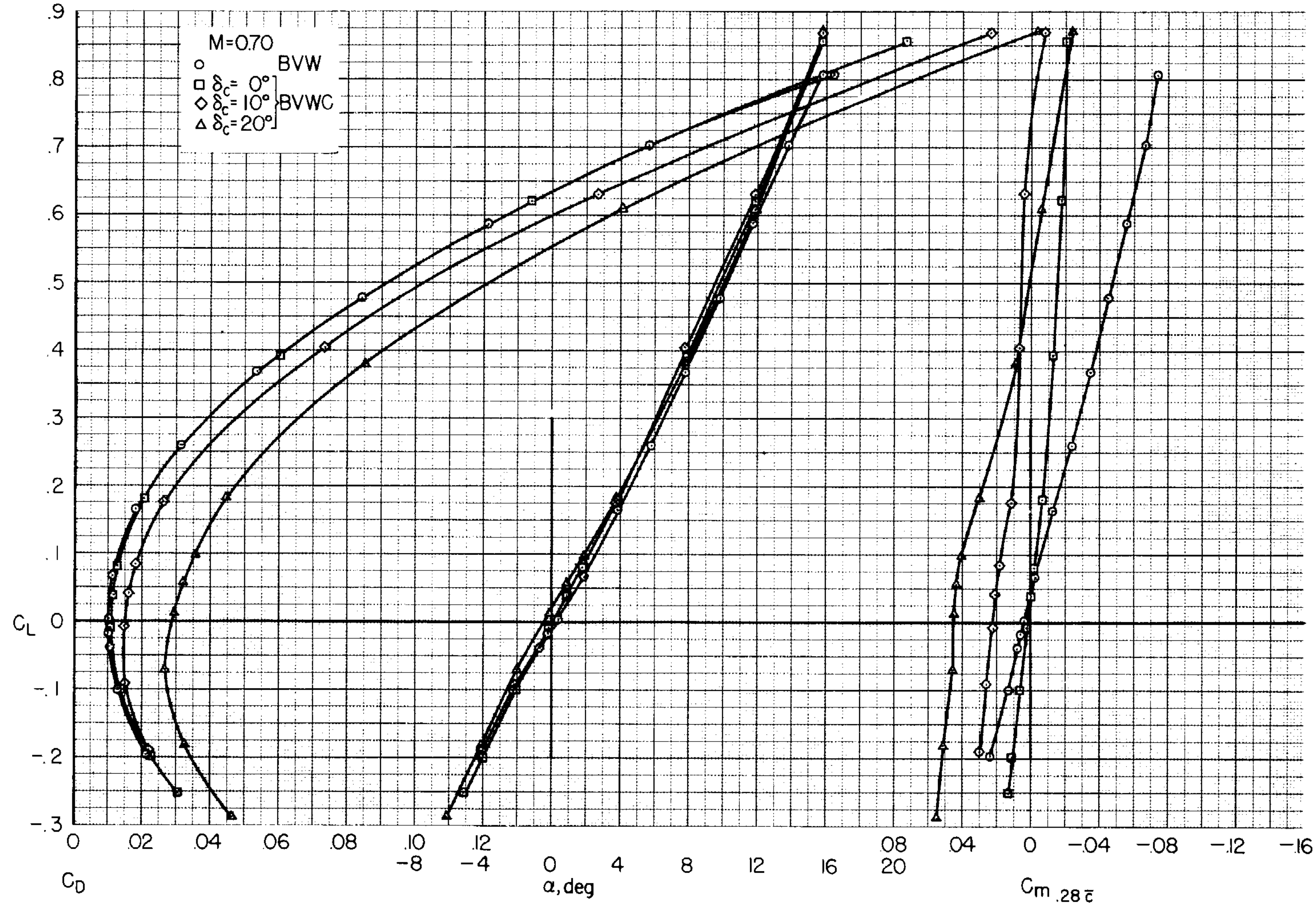
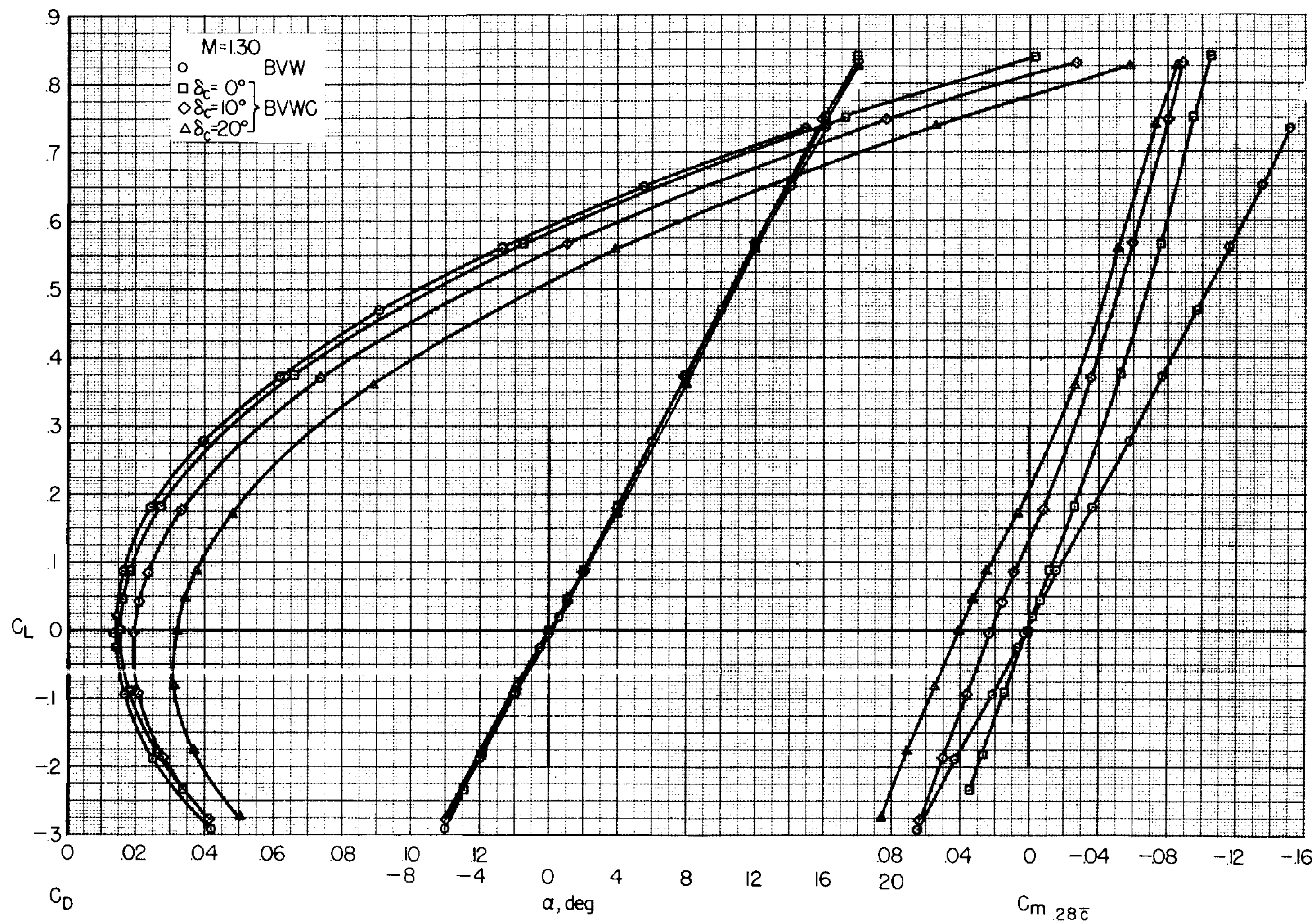


Figure 3.- Details and dimensions of cambered body model.



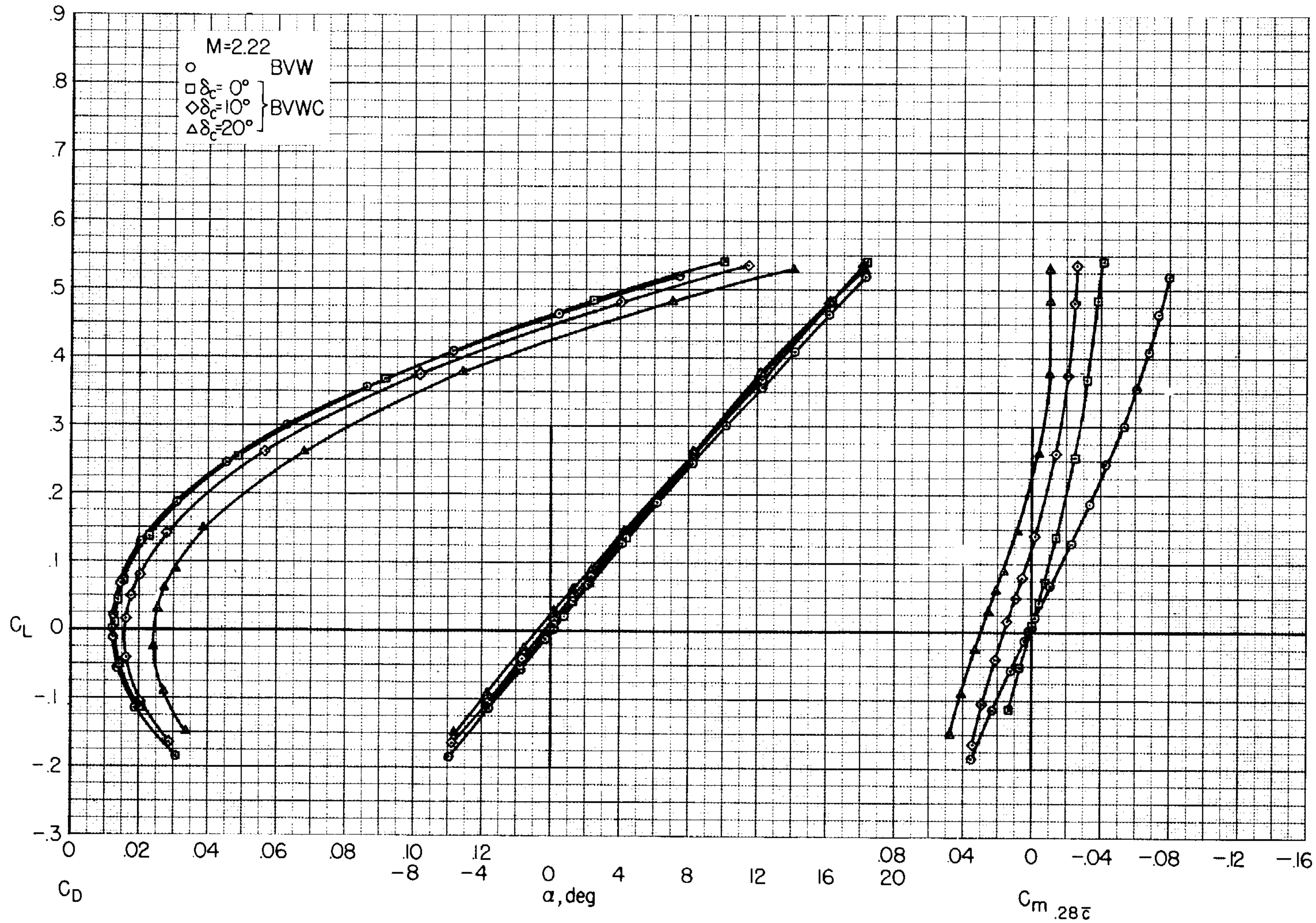
(a) M = 0.70

Figure 4.- Lift, drag, and pitching-moment characteristics of the canard model.



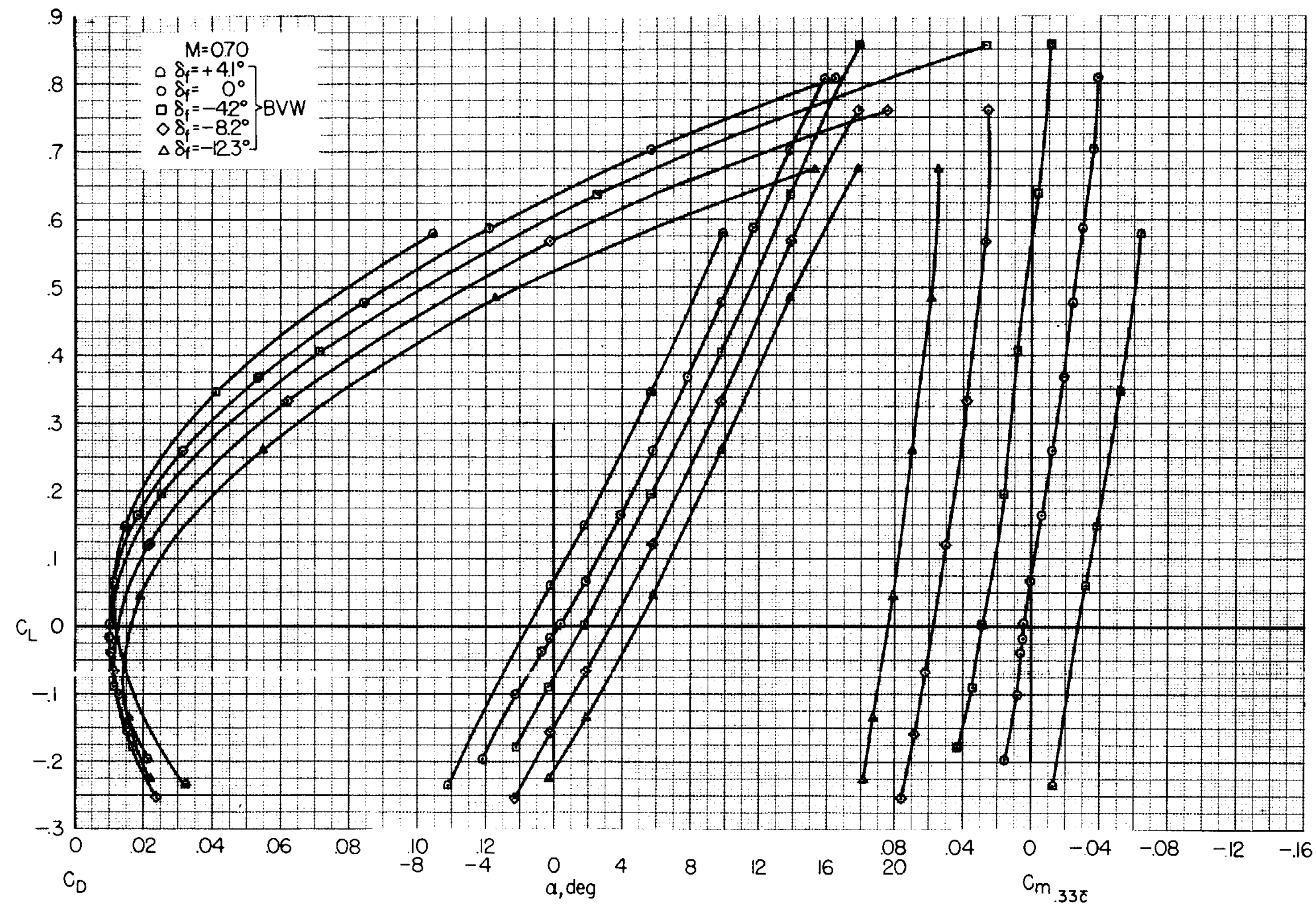
(b) M = 1.30

Figure 4.- Continued.



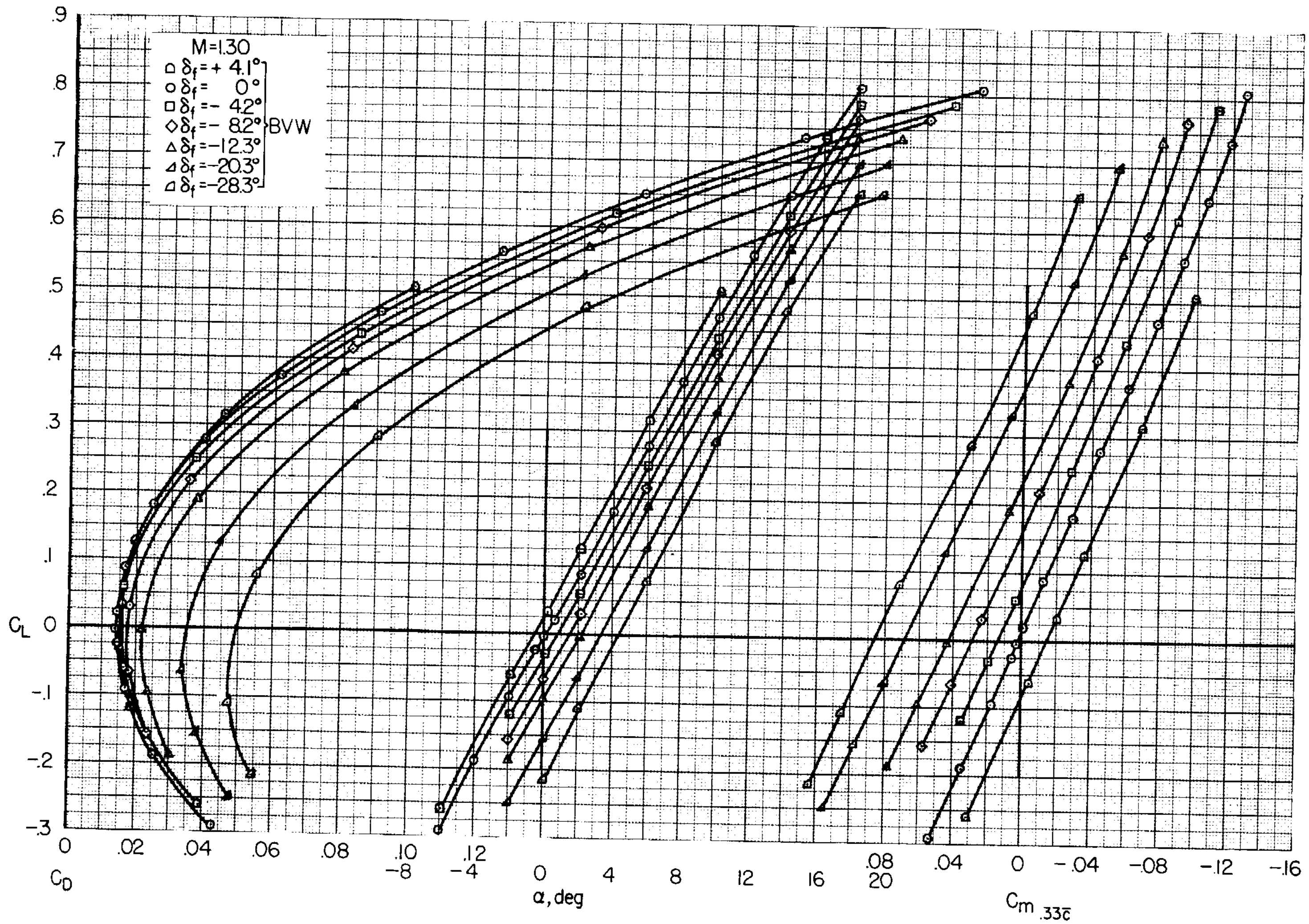
(c) M = 2.22

Figure 4.- Concluded.



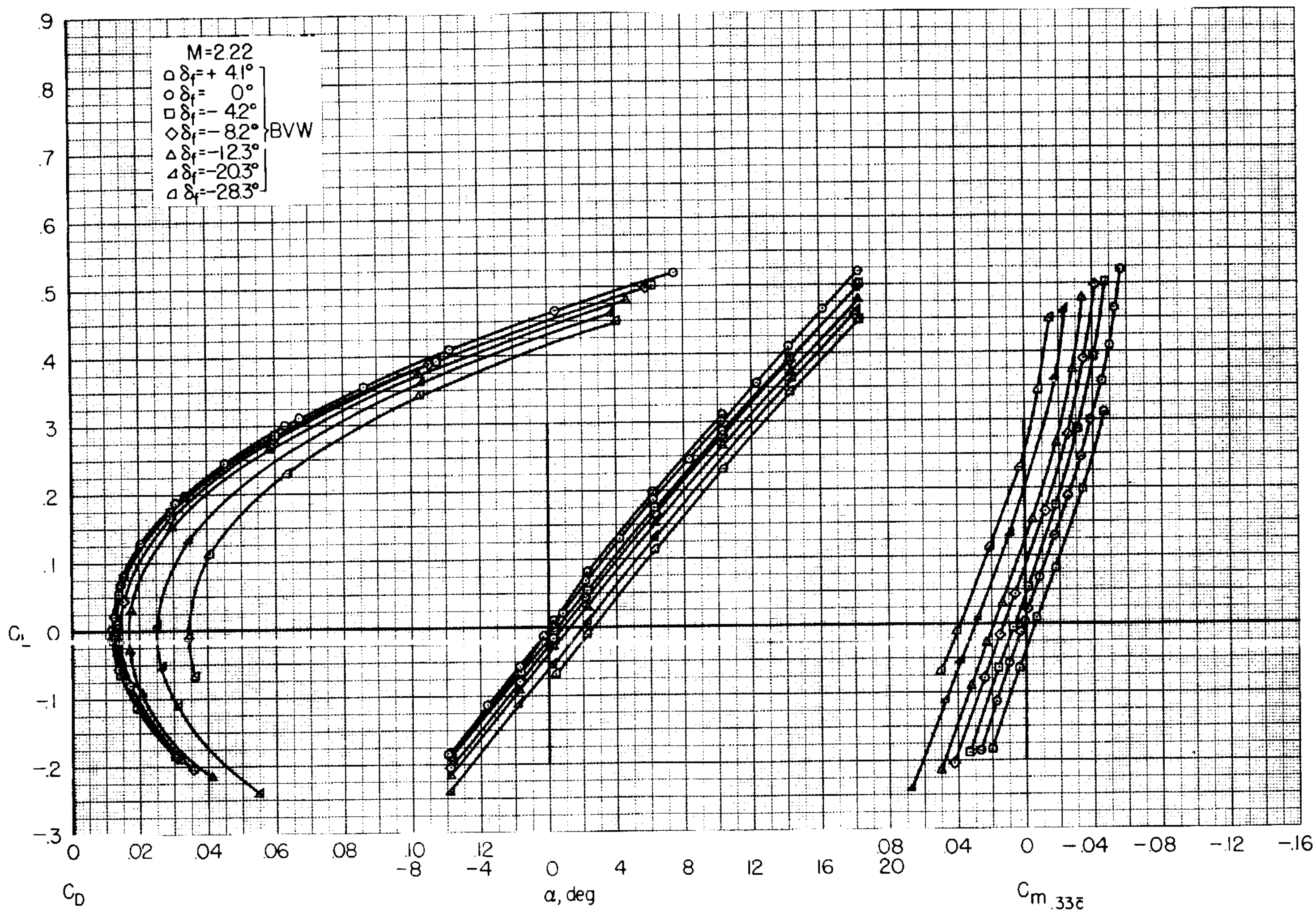
(a) M = 0.70

Figure 5.- Lift, drag, and pitching-moment characteristics of the flap model.



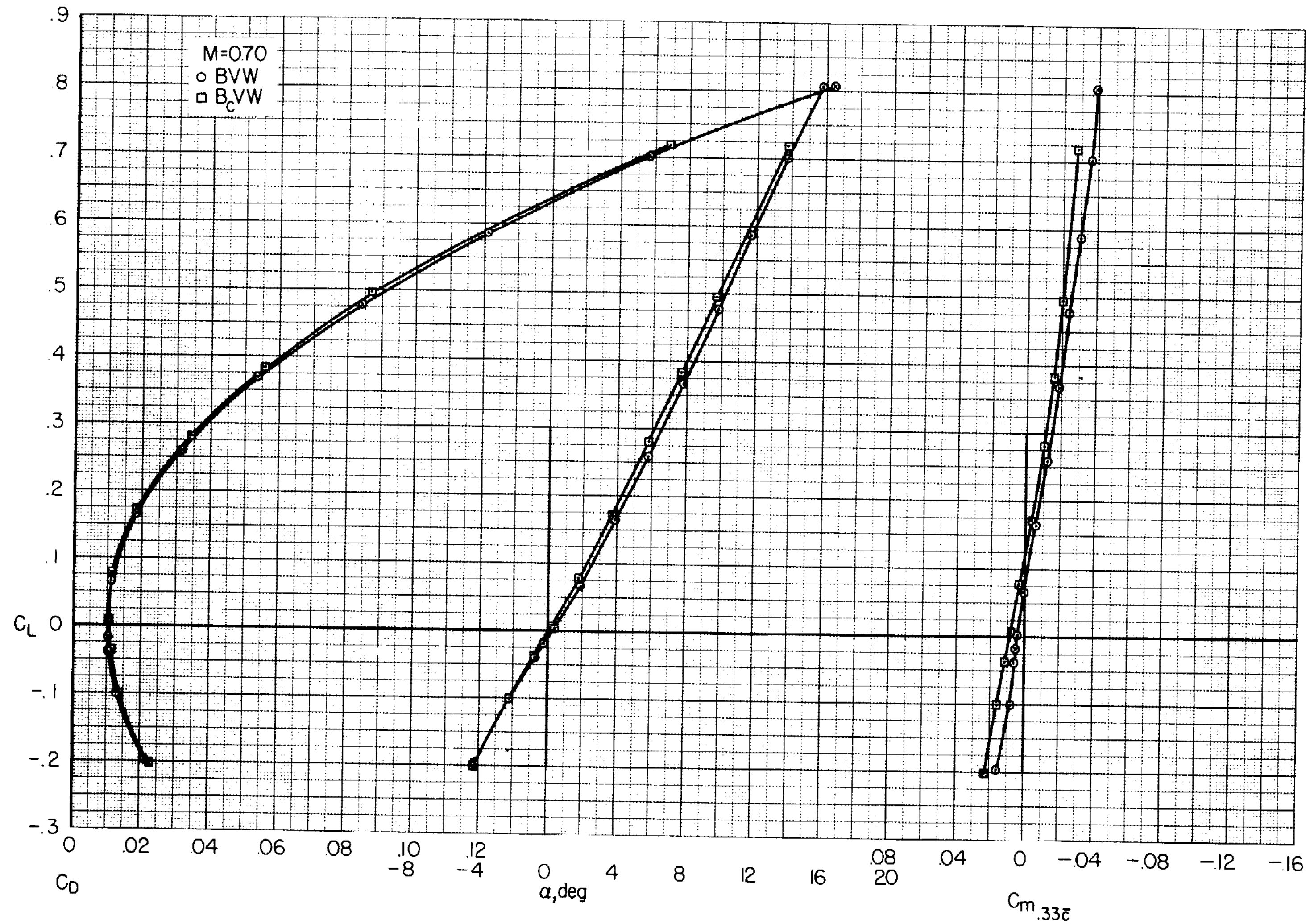
(b) M = 1.30

Figure 5.- Continued.



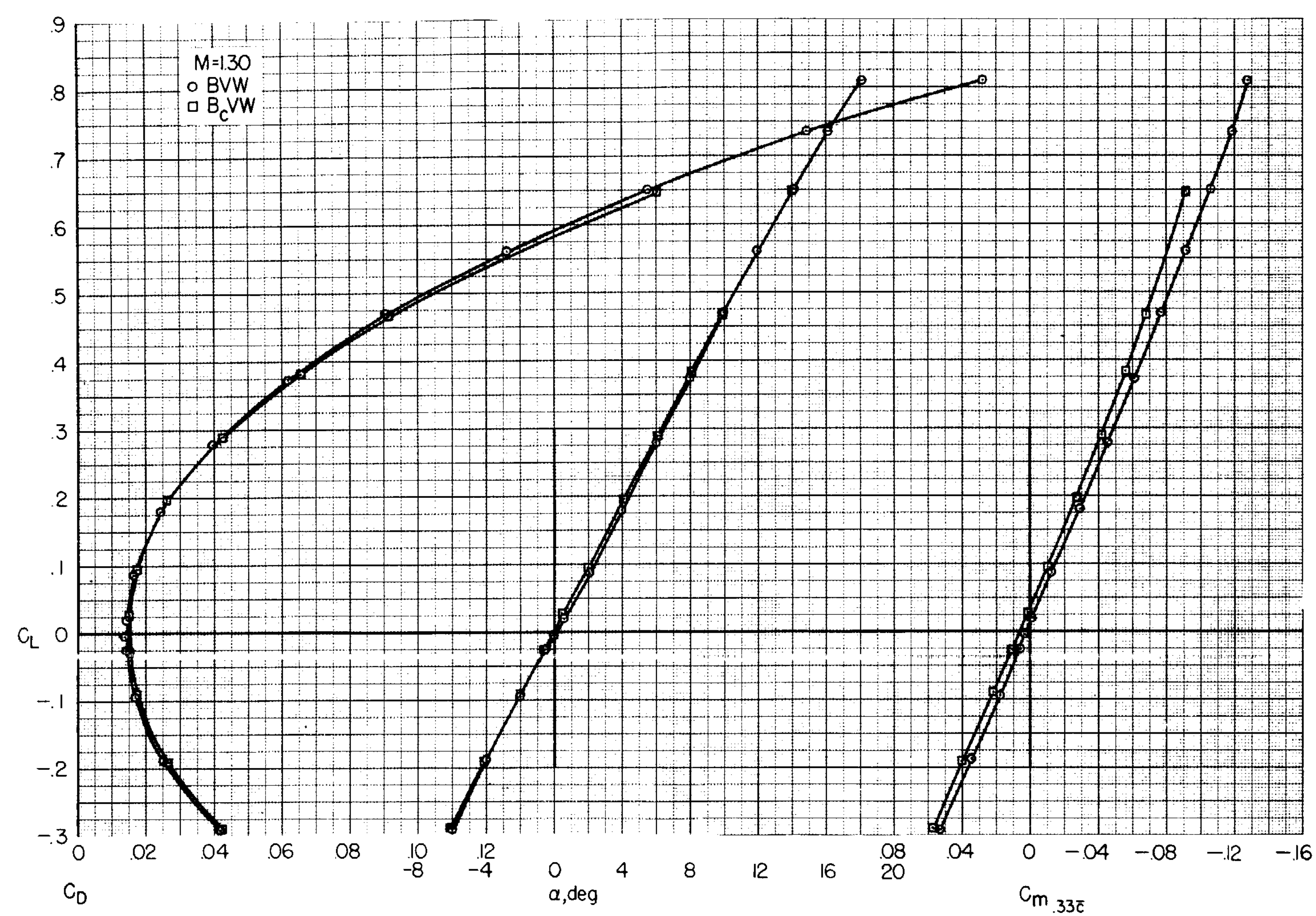
(c) M = 2.22

Figure 5.- Concluded.



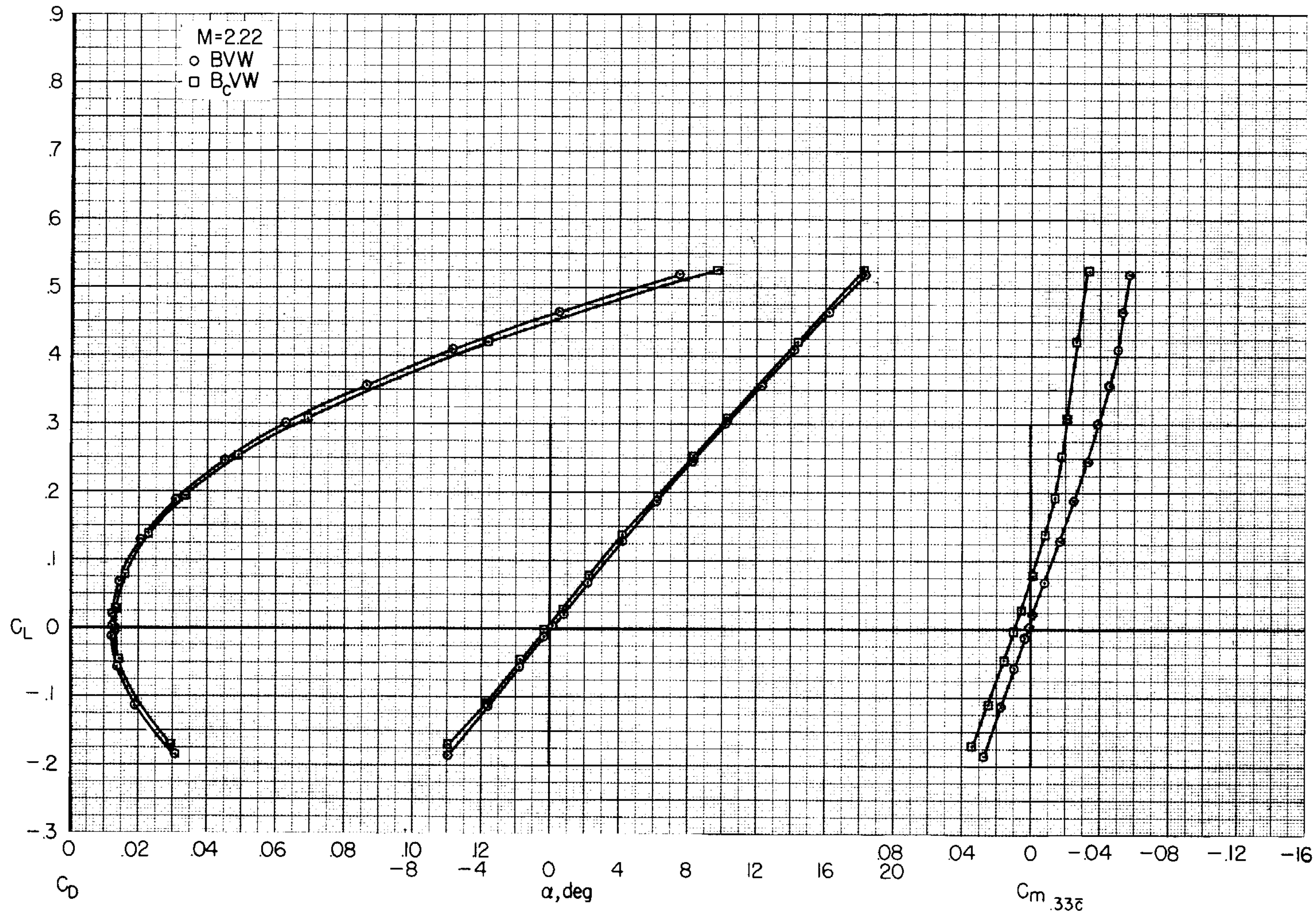
(a) M = 0.70

Figure 6.- Lift, drag, and pitching-moment characteristics of the cambered- and symmetrical-body models.



(b) M = 1.30

Figure 6.- Continued.



(c) M = 2.22

Figure 6.- Concluded.

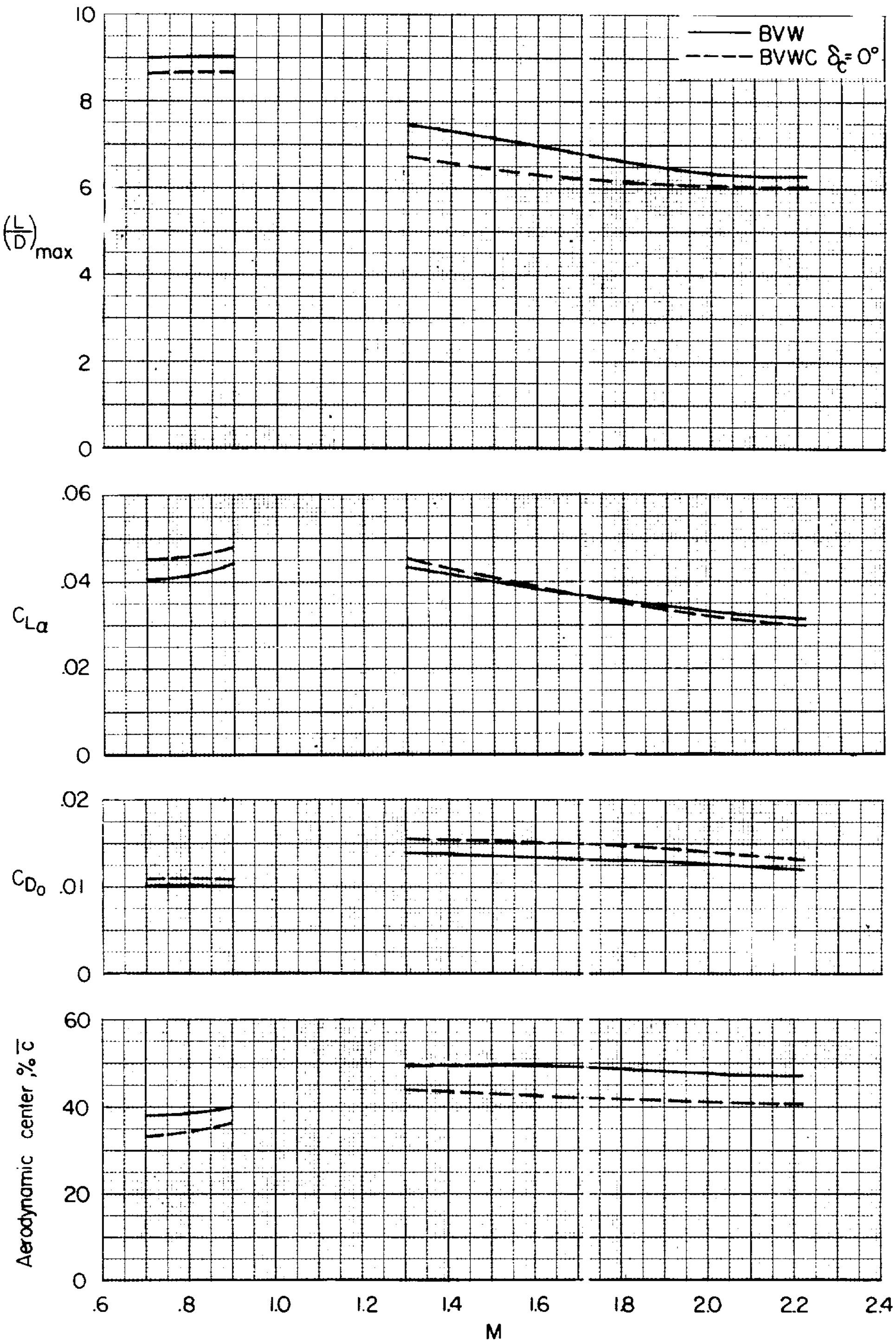


Figure 7.- Variation with Mach number of maximum lift-drag ratios, lift-curve slopes, minimum drag coefficients, and aerodynamic center locations for canard on and off.

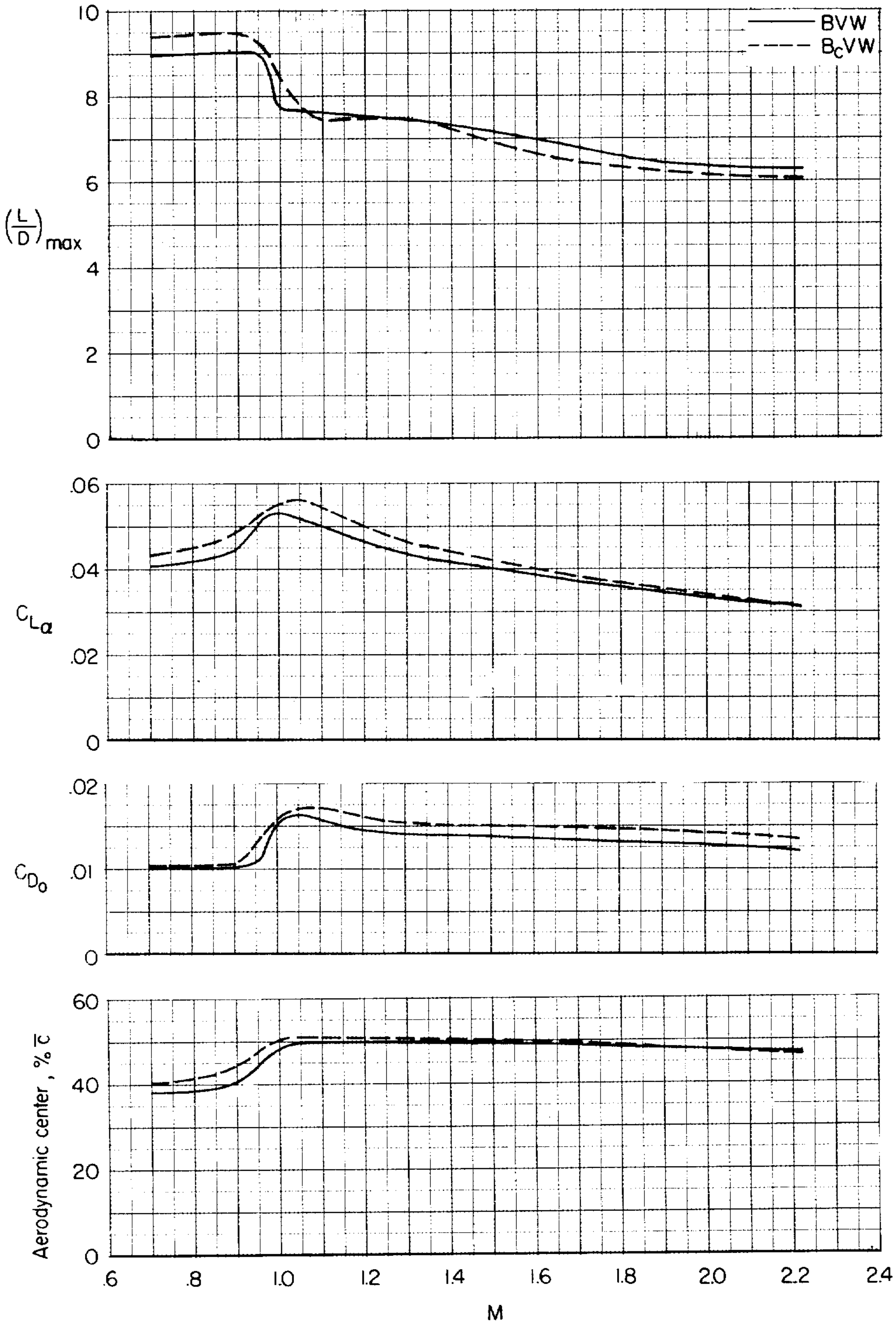


Figure 8.- Variation with Mach number of maximum lift-drag ratios, lift-curve slopes, minimum drag coefficients, and aerodynamic center locations for the cambered- and symmetrical-body configurations.